

Part II Wellhead Protection Plan

Public Water Supplier 1270050

Prepared for the City of St. Louis Park, Minnesota

SEH No. A-STLOU0303.00

April 2006



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St. Louis Park, Minnesota
Public Water Supplier 1270050

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April 2006

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Date

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Documentation List

<u>STEP</u>	<u>DATE PERFORMED</u>
Part I Approval Notice Received from MDH	April 12, 2004
Scoping 2 Meeting Held (MN Rules Section 4720.5349, subp. 1)	May 13, 2004
Scoping Decision Notice Received (MN Rules Section 4720.5340, subp. 2)	June 2, 2004
Remaining Portion of Plan Submitted to Local Units of Government (LGUs) (MN Rules Section 4720.5350, subp. 1 & 2)	January 1, 2006
Review Received From Local Units of Government (MN Rules Section 4720.5350, subp. 2)	March 1, 2006
Review Considered (MN Rules Section 4720.5350, subp. 3)	March 2006
Public Hearing Conducted (MN Rules Section 4720.5350, subp. 4)	April 17, 2006
Remaining Portion Wellhead Protection Plan Submitted (MN Rules Section 4720.5360, subp. 1)	April 21, 2006
Approved Review Notice Received	

Executive Summary

This portion of the wellhead and source water protection (Wellhead Protection) plan for the City of St. Louis Park, Minnesota includes:

- an assessment of applicable data elements,
- the results of the potential contaminant source inventory,
- management strategies for the higher risk potential contaminant sources
- the City's Water Supply Contingency Plan, and
- an Evaluation Plan for the City's Wellhead Protection Program.

Part I of the Wellhead Protection Plan presented the delineation of the wellhead protection areas (WHPAs) and the drinking water supply management area (DWSMA) and included the vulnerability assessments for the City's wells and source water aquifers within the DWSMA. Part I of the Wellhead Protection Plan was submitted to the Minnesota Department of Health (MDH) and was approved on April 12, 2004. The boundaries of the WHPAs and DWSMA are shown in Figure 1 and the vulnerability of the source water aquifers are presented in Figure 2. A copy of Part I of the St. Louis Park Wellhead Protection Plan is provided as Appendix A.

The vulnerability assessment for the source water aquifers within the DWSMA was performed using available information and indicates that some of the bedrock aquifers used by the City are considered vulnerable, to varying degrees, to contamination because several municipal wells and the St. Peter Sandstone and Prairie du Chien-Jordan aquifers have been significantly impacted by groundwater contamination. The deeper Franconia-Ironton-Galesville and Mount Simon-Hinckley bedrock aquifers are not considered vulnerable to contamination from land surface activities and uses due to significantly-thick and laterally expansive shale deposits overlying them. These geologic formations hydraulically separate the two deeper aquifers from the shallower, contaminated aquifers. The aquifer vulnerability is presented in Figure 2. Consequently, the potential sources of contamination to the source water aquifers are all land uses, and other wells that reach or penetrate the aquifers. This information was presented to the Wellhead Protection Manager during the Second Scoping Meeting held with MDH staff on May 13, 2004, when the necessary requirements for the content of Part II were outlined and discussed in detail.

The vulnerability assessment for the St. Louis Park municipal wells that utilize the Mount Simon-Hinckley bedrock aquifer indicates that these wells (Wells 11, 12, 13, and 17) are not vulnerable to contamination based on the information that documents the construction of each well. However, the other eight municipal wells (Wells 3, 4, 6, 8, 10, 14, 15, and 16), utilizing the St. Peter and Prairie du Chien-Jordan source water aquifers, are vulnerable to contamination.

The information and data contained in Sections 1.0 – 4.0 of this portion of the Wellhead Protection Plan (hereafter referred to as Part II of the Plan) support the approaches taken to address potential contamination sources that have been identified as potentially affecting the aquifer used by the public water supply. The reader is encouraged to concentrate attention on Sections 1.0 – 4.0 in order to better understand why the particular management strategies are included in Section 5.0.

In Section 1.0, the required data elements indicated by the MDH in the *Scoping 2 Decision Notice* are addressed, as well as the data's degree of reliability. Pertinent data elements include information about the geology, water quality, and water quantity. The data elements and information supplied in Part I of the Plan are the basis for the assessment that the aquifer providing drinking water for St. Louis Park has the potential to become vulnerable due to certain land uses and activities, and other wells that penetrate the same aquifers.

Section 2.0 addresses the possible impacts that changes in the physical environment, land use, and water resources have on the public water supply. No significant changes are anticipated in the City within the next ten-year period, and City staff has evaluated the support necessary to implement its Plan.

The problems and opportunities concerning land use issues relating to the aquifers, well water, and the DWSMA, and those issues identified at public meetings, are addressed in Section 3.0. The vulnerability status of the aquifer and wells, and the quality of water currently produced by the municipal wells result in the following major concerns: 1) preventing new or additional groundwater contamination to the source water aquifers; 2) other wells located within the DWSMA that could become pathways for contamination to enter the aquifer; and 3) the pumping effects of high-capacity wells that may alter the boundaries of the delineated WHPAs, reduce the hydraulic head in the aquifer, or cause the movement of contamination toward public water supply wells.

The drinking water protection goals that the City would like to achieve with this Plan are listed in Section 4.0. In essence, the City would like to 1) maintain or improve the current drinking water quality, 2) increase public awareness of groundwater protection issues, 3) protect the aquifer, and 4) collect data to support future efforts in Wellhead Protection Planning.

The objectives and action plans for managing the potential sources of contamination are contained in Section 5.0. Actions aimed toward educating the general public about groundwater issues, gathering information about other wells, and collecting data relevant to Wellhead Protection Planning are the general focus.

Section 6.0 contains a guide to evaluate the implementation of the identified management strategies of Section 5.0. The wellhead protection program for City of St. Louis Park will be evaluated on an annual basis prior to its budgeting process.

An emergency/contingency water plan is included to address the possibility that the water supply system is interrupted due to either emergency situations or drought. Section 7.0 references the City's *Water Contingency and Conservation Plan* approved by the Department of Natural Resources.

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Part II Wellhead Protection Plan

Public Water Supplier 1270050

Prepared for City of St. Louis Park

1.0 Data Elements, Assessment

1.1 Required Data Elements

1.1.1 Physical Environment Data Elements

1.1.1.1 Precipitation

This data element does not apply because there is not a direct hydraulic connection between surface waters and the bedrock aquifers serving this water supply system.

1.1.1.2 Geology

This data element is required for, and was presented in, the first part of the Wellhead Protection Plan (please refer to Appendix A). The following recommendations are presented regarding the collection of geologic information over the time this Plan remains in effect:

- Coordinate with MDH staff to have groundwater samples collected from both municipal wells to be analyzed for tritium and Carbon-14 isotopes. This updated data can be used to confirm and validate the vulnerabilities of the source water aquifers.
- Routinely record the static and pumping groundwater levels in the municipal wells. This data can be used in the future to better define the local groundwater flow field of the aquifer, and determine whether the supply of groundwater in the aquifer is diminishing over time.
- Work with county and/or state government agencies in future and ongoing efforts to compile regional geologic and hydrogeologic information through investigations and studies.

1.1.1.3 Soils

This data element does not apply because there is not a direct hydraulic connection between surface waters and the bedrock aquifers serving this water supply system.

1.1.1.4 Water Resources

Generally, this data element does not apply because there is not a direct hydraulic connection between surface waters and the source water aquifers serving this water supply system. However, this data element does apply as it relates to future groundwater uses that may influence the ability of the aquifer to yield water to the public water supply. Increased water use may result in a reduction in aquifer yield or an increased likelihood that contaminants of human or natural origin may affect the quality of drinking water.

1.1.2 **Land Use Data Elements**

1.1.2.1 Land Use

Figure 1 is a map showing the political and legal boundaries of land parcels within and surrounding the WHPAs and DWSMA. The DWSMA significantly extends beyond the city limits of St. Louis Park into the cities of Edina, Golden Valley, Hopkins, Medicine Lake, Minneapolis, Minnetonka, and Plymouth. Due to the DWSMA crossing several municipality boundaries it will be difficult or impossible for the City to control land use activities outside of its borders. However, land use information and the extent of the WHPAs and DWSMA can be helpful to decision-makers in future planning efforts by considering groundwater quality issues and wellhead and source water protection. Figures 3, 4 and 5 depict existing and future land uses within the DWSMA. Most of the existing and future zoning designations for the areas of the DWSMA outside of St. Louis Park could not be attained for this Plan.

Since there are areas within the DWSMA where the upper two source water aquifers have been classified as moderately and highly vulnerable, most land uses have also been considered (please refer to Section 1.1.2.3). The City has also considered the presence and use of other wells within the DWSMA when developing this Plan.

1.1.2.2 Public Utility Services

Records of well construction and maintenance apply to this portion of the plan due to the information provided about the wells and the quality and quantity of the water supplying this system. This information was provided in Part I of the Plan and was used to support the development of Section 7.0 of this Plan, which details a water contingency and conservation plan for this system.

Transportation corridors, storm and sanitary sewers, and gas and oil pipelines are depicted in the figures of this plan. Public drainage systems for the surface waters are not applicable since there is not a direct hydraulic connection between surface waters and the bedrock aquifers used for the City's public water supply system. City staff are unaware of any Class I disposal wells in St. Louis Park and only knows of two (2) private septic systems in the City. The addresses and parcel identification numbers are summarized in Table 1. These two systems are expected to be properly abandoned and sealed in the next few years, and the properties connected to the City sewer system. Furthermore, individual septic systems are not considered a viable threat to the municipal wells or source water aquifers

because the aquifers are not directly connected hydraulically with surface waters.

Table 1
Known Septic Systems in St. Louis Park

Address	Parcel ID No.
1330 Westwood Hills Road	0611721410022
2001 Flag Avenue	0711721120014

1.1.2.3 Potential Contaminant Source Inventory

Since large areas of the St. Louis Park DWSMA have been classified as highly vulnerable to contamination, a comprehensive potential contaminant source inventory was completed for this Plan. The Minnesota Department of Health provided the City information and data pertaining to land uses and activities compiled from various state agency databases. The inventory included all types of land uses that could potentially contaminate groundwater, possibly resulting in adverse impacts to the source water aquifers. Table 2 summarizes the types and numbers of various land uses and activities identified within the entire DWSMA. Figures 6, 7, and 8 depict the locations of these sites.

Since it has been established that the source water bedrock aquifers are not in direct hydraulic connection with surface waters or the land surface, many of the land uses identified in the potential contaminant source inventory are considered low risks for potentially causing the scale of groundwater contamination that could viably impact the municipal wells and/or source water aquifers. For this first edition of the St. Louis Park Wellhead and Source Water Protection Plan, the City focused its efforts on medium- and high-risk potential contaminant sources within the one-year wellhead protection areas for the wells, and within the highly vulnerable areas of DWSMA within the City's limits. In the next few years and for future updates to the Plan, the City intends to extend its review of potential contaminant sources outside of St. Louis Park city boundaries. Section 5.0 of this Plan details management strategies proposed by the City to address the potential sources of groundwater contamination. However, as discussed above, low-risk sites identified through the inventory appear unlikely to result in significant and extensive groundwater contamination that could realistically impact the wells or source water aquifers. Therefore, for this edition of the Plan, the City has elected not to develop management strategies for land uses and activities perceived to be low-risk.

Tables summarizing the information related to the identified land uses and activities within the one-year wellhead protection areas are provided in Appendix B. The addresses affiliated with these sites have been cross-referenced by the City with Parcel Identification Numbers to verify the locations of the potential contaminant sources.

Table 2
Potential Contaminant Source
Inventory Summary

HIGH

Risk Sites	Number
Agricultural chemical storage site	12
Agricultural feed storage site	6
Agricultural seed storage site	3
Agricultural site unknown	58
Dump	11
Federal Superfund site	1
Leaking underground storage tank	300
No further remedial action planned	2
Registered storage tank	326
State Superfund site	2
Suspected hazardous waste site	2
Voluntary investigative clean-up	56

MEDIUM

Risk Sites	Number
Golf course	1
Gravel pit	21
Hazardous waste generator	642
National discharge site	9
Toxic release site	21

LOW

Risk Sites	Number
Air release point	15
Bridge	26
Church	3
Gage station	5
Garden	1
Historical site	7
Hospital	2
Hotel/Motel	8
Museum	2
Nature reserve	1
Park	32
Resource management plan	1
Restaurant	10
School	30
Seaplane landing area	2
Theatre	1
Tower	4

1.1.3 Water Quantity Data Elements

1.1.3.1 Surface Water Quantity

This data element does not apply because there is not a direct hydraulic connection between surface waters and the bedrock aquifers serving this water supply system.

1.1.3.2 Groundwater Quantity

Groundwater levels in the source water aquifers appear adequate for the amounts which the City of St. Louis Park is currently permitted to withdraw under the water appropriation program administered by the Minnesota Department of Natural Resources (DNR). There are currently no other high-capacity wells within the DWSMA from which well interference complaints with the City's wells have been documented. At this time, there appears to be sufficient groundwater quantity, based upon existing pumping capacity and performance of the wells completed in the aquifers used by the City.

1.1.4 Water Quality Data Elements

1.1.4.1 Surface Water Quality

This data element does not apply because there is not a direct hydraulic connection between surface waters and the bedrock aquifers serving this water supply system.

1.1.4.2 Groundwater Quality

This data element applies to this portion of the Plan for the City of St. Louis Park. Existing information consists of isotopic and chemical analyses and indicates that the aquifers used by the City are recharged very slowly by hydraulic and hydrologic interconnections with other aquifers. As such, there is a low probability that current land use has a direct impact on the quality of drinking water. Regionally, the quality of the source water bedrock aquifers is generally good. However, as discussed in Part I of the Plan, several of the St. Louis Park municipal wells (Well Nos. 4, 5, 6, 7, 9, 10, and 15), and the St. Peter and Prairie du Chien-Jordan bedrock aquifers they utilize, have been contaminated by polynuclear aromatic hydrocarbon compounds. This significant groundwater contamination is related to the Reilly Tar Superfund Site located within the City. Extensive investigation and remediation of this site has been conducted over the past two decades. Three of the municipal wells have been removed from the City's public water supply system (Wells 5, 7, and 9). The remaining municipal wells impacted by this contamination are treated with granular activated carbon (GAC) to remove the contaminants (Wells 4, 10, and 15). Well 6 is not currently used by the City. The groundwater quality of the deeper source water aquifers (the Franconia-Ironton-Galesville and the Mount Simon-Hinckley) does not appear adversely affected by this contamination. Municipal Wells 11, 12, 13, and 17 utilize these aquifers.

Additional groundwater quality data will be collected over the ten-year life of the Plan. Historically, groundwater quality information was used to determine the potential source(s) of contamination that need to be inventoried and managed in the moderately and highly vulnerable areas of the DWSMA. Changes in the general chemistry of the groundwater may indicate that the aquifer is receiving recharge from different pathways, such

as improperly constructed or improperly sealed wells or through different geological materials.

1.2 Assessment of Data Elements

1.2.1 Use of the Wells

General information describing the City's public water supply system was presented in the Part I of the Plan provided in Appendix A, and Source Water Assessment (SWA) found in Appendix C of this Plan.

1.2.2 Wellhead Protection Area Delineation Criteria

Please refer to Part I of this Plan (Appendix A) for documentation regarding how the following delineation criteria were applied in determining the boundaries of the WHPAs:

Time of Travel - 10 years

Flow Boundaries - based on geologic information

Daily Volume - provided by the system

Groundwater Flow Field - delineation method was computer modeling

Aquifer Transmissivity - determined from aquifer pumping tests

Figure 1 depicts the extent and geometry of the WHPAs and DWSMA, and Figure 2 presents the low, moderate, and high vulnerability areas of the DWSMA for the upper two source water, bedrock aquifers.

1.2.3 Quality and Quantity of Water Supplying the Public Water Supply Well

As discussed in Section 1.1.4.2, many of the St. Louis Park public water supply wells have been adversely impacted by groundwater contamination affiliated with the Reilly Tar Superfund Site. The impacted wells have been retrofitted with water treatment technologies and engineering controls to ensure safe drinking water for the City's residents. Additional treatment is not necessary at this time.

Samples from the St. Louis Park wells and public water supply system are routinely collected and analyzed by the Minnesota Department of Health as required under the Minnesota Public Water Supply Program and the federal Safe Drinking Water Act. The samples are tested for microorganisms, inorganic compounds, metals, organic and synthetic chemicals, pesticides, herbicides, and radioactive pollutants. In addition, the municipal wells contaminated by the Reilly Tar Superfund Site are monitored for polynuclear aromatic hydrocarbon compounds quarterly. The most recent water quality monitoring report for the Reilly Tar Superfund Site was completed in February 1998. A copy of this report is available through the City.

The City is required by the federal government to publish and distribute an annual *Drinking Water Consumer Confidence Report* (titled the "Water Quality Report") to all citizens using its public water supply system. These reports are posted on the City's website and a copy of the 2003 report is included in this Plan as Appendix D. Regulated substances detected in the City's public water supply include: alpha emitters, arsenic, barium, and

radium (all from erosion and breakdown of natural geologic deposits), fluoride (a required additive), total trichloroethylene (a byproduct of disinfection), trichloroethylene, cis-1,2-dichloroethylene, and trans-1,2-dichloroethylene. Other substances found in the City's public water supply system include radon, lead, copper, sodium, and sulfate. After treatment, the water in the St. Louis Park supply system meets or exceeds all state and federal requirements and limits for these and all other regulated compounds and chemicals.

Over concern for intentional contamination to the public water supply by terrorism or natural catastrophes, the City completed a *Vulnerability Assessment* of its system. This report was completed in June 2004 and included a review of the system's most vulnerable points and recommendations for upgrading and securing the infrastructure. For security reasons copies of this report are not available to the general public.

It appears that the source water aquifers used by the City are sufficient and adequate in quantity and capacity to provide water to the St. Louis Park residents during the life of this Plan and into the future. There are no indications that the performance of source water aquifers are decreasing or degrading. Increases in demand for water in the future will be minimal since the City is fully developed. The City completed a *Comprehensive Water Resources Management Plan* in August 2001. A copy of this report is available through the City.

1.2.4 Groundwater Uses in the Drinking Water Supply Management Area

The management strategies selected and documented in Section 5.0 of this Plan focus on activities that have the most potential to impact the vulnerable aquifers the City is using for its drinking water supply.

Other wells in the DWSMA are considered a significant threat to the source water aquifers and the St. Louis Park public water supply system. If improperly constructed or maintained, they can act as direct conduits for contaminants at the land surface to vertically migrate downward into the deeper aquifers. Shallow wells (i.e. wells open only to upper, unconsolidated sand and gravel or aquifers not used by the City) are not as significant a threat, due to the confined hydraulic conditions exhibited by the source water, bedrock aquifers. High-capacity wells near the municipal wells can cause groundwater interference and decrease the performance and capacity of the municipal wells.

Due to the local and regional groundwater contamination related to the Reilly Tar Superfund Site, the City has inventoried and maintains detailed records of properties with private wells. Information regarding these wells, including addresses and Parcel Identification Numbers are provided in Appendix B. Wells identified within the DWSMA through the Minnesota Geological Survey-Minnesota Department of Health County Well Index are shown in Figure 7.

The Minnesota Department of Natural Resources manages the water appropriation permits for the state. An Appropriation Permit is required for any person or business that uses more than 10,000 gallons of water per day or

1,000,000 gallons per year. The permits are cataloged in the State Water Use Data System. This database was queried when Part I of the Plan was developed to identify high-capacity wells that could potentially influence or impact the local groundwater flow fields and the St. Louis Park municipal wells. The compiled high-capacity well information was provided in Table 3 of Part I of the Plan (a copy of Part I is included in this Plan as Appendix A). The City is not aware of any well interference issues related to the St. Louis Park municipal wells.

2.0 Impact of Changes on Public Water Supply Wells

2.1 Changes Identified in:

2.1.1 Physical Environment

Due to the large area of the DWSMA beyond the St. Louis Park boundaries, it is difficult for the City to ascertain proposed changes to the physical environment outside of the City. However, large-scale changes in the physical environment within the DWSMA are not anticipated during the 10-year period that this Plan is in effect. The geologic conditions that protect the source water aquifers are such that changes in physical environment should have little or no effect on the aquifers within the DWSMA.

2.1.2 Land Use

The City is unable to effectively control land use changes beyond its own boundaries and will be dependent upon neighboring communities and government units to assist in protecting the source water aquifers used by St. Louis Park. Due to the extent of the DWSMA, it is likely that land uses will be altered within the DWSMA over the life of this Plan. The City will cooperate and collaborate with other local government units to develop and implement wellhead and source water protection policies and strategies.

The City is unaware of any proposed large-scale land use changes within St. Louis Park that could potentially impact the municipal wells or source water aquifers, and land uses within the one-year WHPAs are not expected to significantly change over the life of this Plan. However, of particular concern is the Reilly Tar Superfund Site previously discussed in this Plan. The City has been involved in the remediation and redevelopment of this property, and further groundwater contamination will not likely occur. Another concern is the Beltline (Park Nicollet) Dump Site located in the eastern part of the City near Municipal Well 4. This site has also been investigated and groundwater contamination may be present, potentially threatening the municipal well and source water aquifers. The management strategies presented in Section 5.0 address these two sites.

2.1.3 Surface Water

There appears to be no direct hydraulic connection between surface waters and the bedrock aquifers used by the City as a drinking water source. Therefore, any changes to the conditions of surface waters will have little or no impact on the quality or quantity of the public water supply.

2.1.4 Groundwater

With treatment and its existing water supply system, the City provides a good quality and sufficient quantity of water to its residents. However, the

groundwater contamination related to the Reilly Tar Superfund Site is not expected to diminish in the near future or the life of this Plan. As of the date of this Plan, the City does not anticipate a large increase in water use and is not aware of any water use expansions in the DWSMA or immediately adjacent areas.

2.2 Impact of Changes

2.2.1 Expected Changes in Water Use

Since St. Louis Park is well-established and fully developed, the City does not anticipate that its water use will increase by more than one-percent during the life of this Plan. New high-capacity wells or changes to existing Water Appropriation Permits near the municipal wells could impact the performance of the wells, decrease the capacities of source water aquifers, and/or alter the groundwater flow fields and WHPAs.

2.2.2 Influence of Existing Water and Land Use Government Programs and Regulations

The Minnesota Pollution Control Agency is the government agency responsible for regulating and overseeing most potential contaminant sources in the DWSMA related to the environment such as hazardous waste generators, underground and aboveground storage tanks, spills, leaking underground storage tank sites, voluntary investigation and cleanup sites, dumps, Superfund Sites, etc. The Minnesota Department of Agriculture is responsible for regulating facilities, spills, and releases related to agriculture-based chemicals and substances (i.e. manufacturers, retailers, or users of pesticides, herbicides, fertilizers, etc.). The City will continue to rely on these state agencies and their programs and policies to enforce existing regulations. In addition, the City will continue to work with Hennepin County and its programs and policies related to hazardous waste collection and recycling, use of fertilizers on lawns and open spaces, zoning and land use ordinances, and others. Specifically, the City will coordinate efforts with the Natural Resources Unit, the Environmental Protection Division, and the Contaminated Lands Unit of the Hennepin County Environmental Services Department.

Recognizing that the State Well Code has sole authority in permitting wells, there may be existing land use ordinances by local governments that could be revised in the future to address new private wells within the DWSMA. However, there is no discussion or intention at this time of requiring additional regulation related to managing wells within the City's DWSMA. The Hennepin County Environmental Services Department may assist with addressing additional unused/unsealed wells as they are identified. The City also has an ordinance prohibiting the connection of new wells to a plumbing system so that it interconnects with the public water supply distribution system. A copy of this portion of the City Ordinance is available on the City's website: www.stlouispark.org.

2.2.3 Administrative, Technical, and Financial Considerations

For this Plan to be effective:

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1. The City will need to manage medium and high risk potential sources of contamination to prevent new or additional contamination of its source water aquifers.
 2. The City will need to raise public awareness of the issues affecting its drinking water supply through public educational programs.
 3. Administrative duties will remain with the Wellhead Protection Manager, who will report to the City Council, coordinate the implementation of wellhead protection management action plans, and conduct regular meetings.
 4. Support of wellhead and source water protection activities will be provided by funds from the City's utility water operating fund as well as a Wellhead Protection budget line item to be created during the next budgeting process. Other sources of funding or in-kind services to help achieve the goals set forth in this Plan's Section 4.0 includes:
 - a. the Minnesota Pollution Control Agency and Minnesota Department of Agriculture and their environmental contamination prevention and cleanup programs;
 - b. the Minnesota Department of Health Drinking Water Protection Division in monitoring the groundwater contamination from the Reilly Tar Superfund Site and the City's water treatment plants;
 - c. Hennepin County Environmental Services Department and their hazardous waste management, natural resource protection, and contamination cleanup programs and their well sealing cost-share program;
 - d. the Minnesota Department of Health Source Water Protection Unit assisting with determining the correct measures for sealing unused wells, constructing new wells, and requiring the sealing of unused wells if this becomes necessary; and
 - e. the Minnesota Rural Water Association providing technical assistance during the wellhead protection implementation phase.
 5. The costs of implementing wellhead and source water protection activities will be evaluated on an annual basis to determine whether the original cost estimates match the scope of the management practices identified in this part of the Plan, changes in the status of the wells, and actual costs related to proper sealing of unused/unsealed wells. The City will discuss changes in Plan implementation costs with MDH to determine the availability of state or federal funding for offsetting increased costs to plan implementation.

3.0 Issues, Problems, and Opportunities

3.1 Land Use Issues, Problems, and Opportunities Related to:

3.1.1 The Aquifer

The source water bedrock aquifers, should be relatively unaffected by most land use activities, with the exception of medium- and high-risk potential contaminant sources and other wells that penetrate the same aquifers.

3.1.2 The Well Water

This Plan is primarily concerned with potential contaminant sources near the municipal wells and within the DWSMA that pose a medium or high risk for causing groundwater contamination that could viably impact the source water aquifer and/or public water supply wells. Based on the potential contaminant source inventory, these types of sites, facilities, land uses, or activities included: underground and aboveground storage tanks, leaking underground storage tank sites, voluntary investigation and cleanup sites, facilities that manufacture, store, sell, or utilize large quantities of agricultural chemicals and substances, dumps, state or federal Superfund sites, and hazardous waste generators.

Most of the City's public water supply wells have been impacted by contamination from the Reilly Tar Superfund Site. The groundwater obtained by the St. Louis Park municipal wells open to the St. Peter Sandstone bedrock aquifer and/or the Prairie du Chien-Jordan bedrock aquifer are contaminated with polynuclear aromatic hydrocarbon compounds. The City currently removes these pollutants from the public water supply system with granular activated carbon treatment plants. Through the management strategies presented in this Plan, the City intends to prevent additional contamination of its municipal wells and source water aquifers.

This wellhead protection plan is also concerned with other water supply wells located within the DWSMA. The potential contaminant source inventory indicated several wells in the DWSMA. Some of these wells may extend into the aquifers that supply water to the City. These wells, if constructed and maintained improperly, could convey pollutants to the source water aquifers.

The placement of additional high-capacity wells, increased pumping from existing wells, or significant changes in current groundwater appropriations within the DWSMA may have an impact on groundwater availability to all users, or increased risk that contamination may enter the part of the aquifer used by the public water supply wells.

3.1.3 The Drinking Water Supply Management Area

Numerous medium- and high-risk potential contaminant sources were identified within the St. Louis Park DWSMA. Some of these sources are within areas of the DWSMA where the upper two source water, bedrock aquifers have been determined to have a high vulnerability to contamination. Furthermore, nearly half of the DWSMA is outside of the limits of the City. This will make it difficult for the City to effectively implement the management strategies for the medium- and high-risk potential sources of contamination. The City will need to actively cooperate and collaborate with other local government units and neighboring communities to ensure protection of the source water aquifers.

A principal concern expressed by the City is to ensure consistent and long-term management of water wells, environmental boreholes, and observation wells within the DWSMA. The public water supply has limited legal capabilities to regulate well construction and sealing in the areas of the DWSMA beyond its legal authority. Changes in land use that increase

pumping of the aquifers used by the City's wells need to be assessed for possible impacts on water availability and quality. Finally, the City has no regulatory authority over water appropriations and must rely on the Minnesota Department of Natural Resources (DNR) to address issues and concerns related to pumping.

3.1.4 Storage Tanks

Underground and aboveground storage tanks used to store large quantities of liquid chemicals and potentially hazardous substances are classified in this Plan as high-risks for groundwater contamination. If leaking or ruptured, these tanks could release large quantities of chemicals into the subsurface, which could eventually enter the source water aquifers and municipal wells. A total of 326 registered storage tanks were identified within the entire DWSMA. Two storage tanks were identified within the one-year WHPA for Municipal Wells 8 and 16, and the one-year WHPA for Wells 3, 10, 11, and 15. Nine storage tanks were identified within the one-year WHPA for Municipal Wells 13 and 14. Seven storage tanks were identified within the one-year WHPA for Municipal Well 4. Detailed information regarding these storage tank sites are provided in Appendix B.

3.1.5 Leaking Underground Storage Tank Sites

Leaking underground storage tank (LUST) sites are classified in this Plan as high-risks for groundwater contamination. As discussed in the previous section, these sites have had a storage tank release its contents into or onto the ground. Although many have been "cleaned" and "closed" by the Minnesota Pollution Control Agency, some of these sites may still have remaining soil and/or groundwater contamination. A total of 300 LUST sites were identified within the entire DWSMA. Six LUST sites were identified within the one-year WHPAs for Wells 8 and 16, and for Wells 13 and 14. Two LUST sites were identified within the one-year WHPA for Wells 3, 10, 11, and 15, and nine of these sites were identified within the WHPA for Municipal Well 4. Detailed information regarding these sites are provided in Appendix B.

3.1.6 Voluntary Investigation and Cleanup Sites

Voluntary Investigation and Cleanup (VIC) sites are properties where environmental contamination has been investigated and in some cases remediated. VIC sites are considered a high-risk for groundwater contamination in this Plan due to the likelihood of remaining soil and/or groundwater contamination at these sites. A total 56 VIC sites were identified within the entire DWSMA. Two VIC sites were identified within the one-year WHPA for Municipal Well 4. One VIC site was identified in the one-year WHPAs for Municipal Wells 13 and 14, and for Wells 3, 10, 11, and 15. No VIC sites were identified in the one-year WHPA for Municipal Wells 8 and 16. Detailed information regarding these sites are provided in Appendix B.

3.1.7 Agchem Facilities

Agchem facilities are businesses, facilities, or properties that manufacture, use, sell, or store large quantities of chemicals, solvents, and substances for agricultural purposes. These types of sites are considered high risks for

groundwater contamination in this Plan. A total of 79 sites were identified within the entire DWSMA. Two agchem sites were identified in the one-year WHPAs for Wells 13 and 14, and Well 4. One agchem site was identified in the one-year WHPAs for Wells 8 and 16 and for Wells 3, 10, 11, and 15. Detailed information regarding these sites are provided in Appendix B.

3.1.8 Dumps

Dumps are properties where uncontrolled dumping of waste occurred in the past. These types of sites are considered high risks for groundwater contamination. A total of 11 dumps were identified within the entire DWSMA. However, none of the dump sites appear to be within the one-year WHPAs for the municipal wells.

3.1.9 Superfund Sites

State and federal Superfund Sites are properties where soil and groundwater contamination has likely occurred. These types of sites are considered high risks for significant groundwater contamination. A total of five Superfund Sites were identified within the entire DWSMA. However, none of the Superfund sites appear to be within the one-year WHPAs for the municipal wells.

3.1.10 Hazardous Waste Generators

Hazardous waste generators are facilities or businesses registered and regulated by the State that generate a specified amount of hazardous waste per month. These types of sites are typically considered to be medium risks for groundwater contamination. A total of 642 hazardous waste generators were identified within the entire DWSMA. Six sites were identified in the one-year WHPA for Municipal Wells 8 and 16. Seventeen (17) hazardous waste generators were identified within the one-year WHPA for Municipal Wells 13 and 14. Five (5) hazardous waste generators were identified within the one-year WHPA for Municipal Wells 3, 10, 11, and 15, and thirteen (13) were identified within the one-year WHPA for Municipal Well 4.

3.1.11 Other Sites and Land Uses

Other minor potential contaminant sources were inventoried, but many of these sites are considered to be low-risk threats for the magnitude of groundwater contamination capable of impacting the municipal wells and/or source water aquifers.

3.1.11.1 Golf Courses

Several golf courses are within the St. Louis Park DWSMA. One golf course was identified within the one-year WHPA for Municipal Wells 8 and 16. However, chemicals used on the golf courses turf are unlikely to infiltrate the subsurface and contaminate groundwater or the source water bedrock aquifers used by the City. There is not a direct hydrologic connection between surface waters and the bedrock aquifers. Therefore, golf courses are not considered a significant threat to the City's public water supply.

3.1.11.2 Gravel Pits

A few gravel pits and gravel mining operations exist or have existed within the DWSMA. These gravel pits are relatively shallow and have not required

extensive dewatering; therefore, gravel mining operations are unlikely to impact the source water bedrock aquifers or the municipal wells. However, the City should be cognizant of proposed, future gravel mining operations and their location relative to the municipal wells. Deep gravel pits can be conduits for pollutants to penetrate into the subsurface, potentially impacting bedrock aquifers.

3.1.11.3 Low-Risk Sites

Other low risk sites included in the database provided by the Minnesota Department of Health were depicted in Figure 8. It is very unlikely that these types of land uses or facilities could cause significant groundwater contamination of large-enough magnitude to impact the municipal wells or source water aquifers. These types of sites and facilities include churches, hospitals, hotels/motels, museums, restaurants, schools, theaters, historical sites, gardens, nature reserves, parks, sites with resource management plans, bridges, air release points, gage stations, seaplane landing areas, and towers. For this edition of the Plan, the City has decided to not develop management strategies for these low-risk, low priority land uses.

3.2 Identification of:

3.2.1 Problems and Opportunities Disclosed at Public Meetings and in Written Comment

At the beginning of the planning process other local government units (LGUs) were identified and informed that the City was beginning the wellhead protection planning process. (See Appendix E for a list of LGUs.) Each unit of government was also sent a copy of the City's delineated WHPAs and DWSMA, and vulnerability assessments for the wells and DWSMA. To date, no comments from the LGUs have been received. The general public was also given opportunities to participate in the planning process and to comment at the public informational meeting and public hearing. No concerns from the general public have been expressed at this time.

3.2.2 Data Elements

The state's Wellhead Protection Rule requires that existing information be utilized in developing Part I of the Wellhead Protection Plan. Much of the data collected and utilized to delineate the City's WHPAs and DWSMA, and to determine the vulnerability of the aquifer to possible contamination, comes from small-scale or regional studies. There is a limited amount of subsurface information available to precisely define local groundwater flow conditions and the groundwater chemistry of the aquifer within the DWSMA. The direction of groundwater flow was evaluated in Part I of the Plan to address concerns that the current amount of subsurface information does not permit an unquestioned determination of local groundwater flow conditions toward the City's water supply wells. As a result, delineation of the WHPAs represents a composite of capture zones generated by varying aquifer properties.

The City plans to utilize public education opportunities, both existing and proposed, to address potential contamination of the aquifer by medium- and high-risk potential sources of contamination. Additionally, the City will work

in cooperation with the Hennepin County Environmental Services Department to utilize the existing programs currently available. The City has an ordinance in place that prohibits the cross connection between privately owned wells and the community water supply distribution system. The City will set a high priority on well sealing for existing wells that are unused or not properly maintained.

The City will work with the MDH to 1) identify proposed wells that may present these additional concerns, 2) ensure new wells are properly constructed, 3) determine whether an alternative aquifer could be used, and 4) identify water-use and conservation requirements that the DNR may specify with their water appropriations permit.

St. Louis Park plans to continue to focus its data collection efforts on the following activities throughout the ten-year life of this Plan:

1. Collect more detailed information on all medium- and high-risk potential sources of contamination within the DWSMA and maintain and update this information in a database.
2. The MDH and/or the Minnesota Rural Water Association will assist the City in evaluating and prioritizing the medium- and high-risk potential sources of contamination within the DWSMA and assist in implementing the management strategies in this Plan.
3. The City will work with the MPCA to identify sites and facilities that could contaminate groundwater and evaluate the likelihood and risk of impacting the source water aquifers or municipal wells.
4. The City will work with MDH to identify new wells that are constructed within the DWSMA and to verify their locations.
5. The City will inform MDH when any municipal well is repaired so that information regarding well construction, static water level, and pumping capacity can be verified or updated.
6. The City will collect water samples on a biennial basis from each well and analyze the well water for total anions and cations. The results of this monitoring will be used to determine trends in natural water quality.
7. The MDH will collect a water sample from at least one well in each of the source water bedrock aquifers and have the samples analyzed for tritium or Carbon-14 isotopes. Testing results will be used to document that the rates of recharge to the aquifers are not increasing and that they are still hydraulically isolated from surface waters.
8. The City and MDH will inform each other of additional high-capacity wells that are to be constructed within the DWSMA or within a mile of its boundary. MDH will determine with the DNR whether the applicant for a water appropriations permit needs to conduct an aquifer test to evaluate the long-term pumping impacts on the City's water supply wells.
9. The MDH will be informed of any wells that are to be properly sealed within the DWSMA so that the Minnesota Geological Survey can be

notified and determine whether it can run a borehole geophysical survey of the wells.

3.2.3 Status and Adequacy of Official Controls, Plans, and Other Local, State, and Federal Programs on Water Use and Land Use

There are many tools available to the regulating agencies that may be used to achieve the wellhead and source water protection planning goals identified by the wellhead planning team. State and local governmental units, such as the MPCA, the MDH, the MDA, Hennepin County, and the DNR, regulate:

- well construction – MDH,
- well sealing – MDH,
- groundwater appropriation permits – DNR,
- public water supply quality – MDH,
- setbacks for specific contaminant sources from a well – MDH and local governments through conditional use permitting, and
- land use controls - local governments,
- hazardous waste generators – MPCA,
- dumps – MPCA,
- storage tanks – MPCA,
- leaking underground storage tanks – MPCA,
- Superfund Sites – MPCA and U.S. EPA,
- agchem facilities – MDA.
- hazardous waste recycling and management – Hennepin County
- natural resources protection – Hennepin County

The City recommends that no additional regulations be imposed at this time and are confident that local issues may be adequately addressed through existing processes. Processes include public education, adoption of best management practices for well maintenance and water conservation, and good communication with residents and landowners within the DWSMA.

The Hennepin County Environmental Services Department will be contacted to determine the availability of cost-share funds to assist with the sealing of identified unused/unsealed wells within the DWSMA.

4.0 Wellhead Protection Goals

The source water aquifers for the St. Louis Park public water supply are deep underground and are at least partially protected from land surface activities. As such, this Plan focuses on addressing and managing medium- and high-risk potential sources of groundwater contamination and other wells. The overall goals of this Plan are to 1) prevent further contamination of the source water bedrock aquifers, and 2) manage the source water aquifers cooperatively with other local government units to assure sustainable water supplies of all users in the future.

The St. Louis Park public water supply system has enjoyed a sufficient water supply in the past, and proposes through the implementation of this Plan to continue supplying safe, potable water for its customers into the future.

The City identified the following goals to be achieved with the action items contained in this Plan:

- Maintain the current level of water quality, which meets or exceeds all state and federal standards.
- Educate public officials, landowners and the general public about the importance of wellhead protection to protect the public drinking water supply.
- Provide ongoing collection of data to support future wellhead protection efforts.
- Increase general public awareness of groundwater problems.
- Implement active, community-wide, water conservation program.
- Assess the impact on the source water aquifer from existing and planned wells within the DWSMA.
- Address priority actions regarding identification and inventory of wells within the DWSMA.
- Address priority actions relating to management of storage tanks.
- Address priority actions relating to management of LUST sites.
- Address priority actions relating to management of VIC sites.
- Address priority actions relating to management of Superfund sites.
- Address priority actions relating to management of hazardous waste generators.
- Address priority actions relating to management of former dumps.

5.0 Objectives and Plans of Action

5.1 Establishing Priorities

Since the DWSMA for St. Louis Park is so large and extends beyond the boundaries of the City, the actions and strategies presented in this Plan had to be prioritized to be effectively implemented. Due to the number of medium- and high-risk potential contaminant sources within the DWSMA, the City has elected to address them in the following order:

1. High-risk potential sources of contamination within the one-year WHPAs of the municipal wells.
2. Medium-risk potential sources of contamination within the one-year WHPAs of the municipal wells.
3. High-risk potential sources of contamination in highly vulnerable areas within City limits.
4. Medium-risk potential sources of contamination in highly vulnerable areas within City limits.
5. High-risk potential sources of contamination in highly vulnerable areas within the entire DWSMA.

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6. Medium-risk potential sources of contamination in highly vulnerable areas within the entire DWSMA.
 7. Low-risk potential sources of contamination in highly vulnerable areas within the entire DWSMA.

5.2 Potential Contaminant Source Database

The City will utilize the information collected for this Plan to continue developing a comprehensive database of potential sources of groundwater contamination with the DWSMA. This database will include a detailed inventory of all land uses in the DWSMA based on the uses identified in the MDH PCSI Code definitions. In addition, the City will continue to add information to the database as additional potential contaminant sites are identified through working with various local and state government agencies. Presently, the City has cataloged and verified the locations of at least 25 sites for each type of potential contaminant source or threat using Parcel Identification Numbers. All information collected for the database will be compatible with GIS mapping software. Information and data currently incomplete in the database will be added over time.

5.2.1 Source of Action

St. Louis Park Public Works and Community Development Departments

5.2.2 Cooperators

Local and state agencies including Hennepin County, the MN Department of Natural Resources, the MN Pollution Control Agency, the MN Department of Health, and the MN Department of Agriculture.

5.2.3 Time Frame

Initiated in 2006 and ongoing thereafter.

5.2.4 Estimated Cost

This task will require approximately 16 hours of City staff time per year.

5.2.5 Goal(s) Achieved

The database will be a useful tool to track, catalog, and document: a) releases of compounds potentially threatening the public water supply, b) cleanup activities should a release occur, c) well sealings/abandonments and installations, d) installation and/or removal of storage tanks containing hazardous materials/substances, e) changes in land uses and activities within the DWSMA, f) locations of hazardous wastes and materials that could impact the public water supply. This information can also be valuable in drafting new or revised future regulations relating to specific land uses/activities in the DWSMA, as deemed necessary.

5.3 Management of Sites with Documented Environmental Contamination

Several sites with documented environmental contamination were identified within the DWSMA. These sites include leaking underground storage tank sites, voluntary investigation and cleanup (VIC) sites, federal and state Superfund sites, and dumps. The City proposes to contact the MPCA project managers for these sites, and inquire about the status of the investigations

and the current and future potential for groundwater contamination. As applicable, the City will request copies of detailed information from the MPCA files regarding the sites if they are determined to threaten the source water aquifer(s). In addition, the City will request that it be notified in the future by the MPCA of significant developments occur regarding each of the sites.

5.3.1 Source of Action

St. Louis Park Wellhead Protection Manager

5.3.2 Cooperators

MPCA staff

5.3.3 Time Frame

The MPCA will be initially contacted in 2006 and then annually thereafter.

5.3.4 Estimated Cost

There may be document duplication costs for copying MPCA files. It is expected that this task will require approximately four to eight hours of staff time per year.

5.3.5 Goal(s) Achieved

Obtaining information regarding environmentally contaminated sites within the DWSMA will allow the City to determine the risk that each site poses to the source water aquifers. It will also foster communication with the MPCA and inform them of the vulnerability of the upper source water aquifers in St. Louis Park.

5.4 Management of Facilities/Properties with Large Quantities of Petroleum Products

5.4.1 Public Education for Owners or Users of Underground and Aboveground Storage Tanks

The City proposes to send reminder notices regarding state and federal regulations and the importance of early leak detection to owners and users of new and existing storage tanks located within the DWSMA. Notices will be mailed annually.

5.4.1.1 Source of Action

St. Louis Park Public Works and Community Development Departments

5.4.1.2 Cooperators

City Planning and Fire Department Departments; MPCA; storage tank owners

5.4.1.3 Time Frame

To begin in 2007 and annually thereafter.

5.4.1.4 Estimated Cost

Costs will include postage for mailing the materials. It is assumed that the pamphlets and informational brochures will be provided by the MPCA free

of charge. This task is projected to require approximately eight hours of City staff time per year.

5.4.1.5 Goal(s) Achieved

Informing storage tank owners and users that they are located within an environmentally sensitive area, and ensuring that they are meeting applicable regulations, will help prevent or minimize the number and severity of petroleum product releases from storage tanks.

5.4.2 Facilitating Storage Tank Owners Training Sessions

The City will coordinate with the MPCA to facilitate and sponsor a training session for local storage tank owners and users.

5.4.2.1 Source of Action

St. Louis Park Public Works, Community Development, and Fire Departments

5.4.2.2 Cooperators

MPCA staff; storage tank owners and users

5.4.2.3 Time Frame

First training session to be offered in 2009 and as deemed appropriate thereafter.

5.4.2.4 Estimated Cost

This task will require approximately 20 hours of city staff time per year.

5.4.2.5 Goal(s) Achieved

Storage tank owners within the DWSMA will be notified that they are in an environmentally-sensitive area and releases from storage tanks could threaten or damage the public water supply system. They will be better informed on the consequences of leaks and releases from storage tanks and will be educated in ways to prevent them. This should result in fewer future storage tank releases, and will diminish the risk of impacting the vulnerable source water aquifer(s).

5.5 Management of Facilities/Properties that Use, Store, Generate, Apply, or Sell Agricultural-Related Chemicals

5.5.1 Public Education

The City proposes to annually send a letter to the facilities located within the DWSMA that use, handle, store, generate, apply or sell large quantities of chemicals used for agricultural purposes (fertilizers, pesticides, herbicides, etc.). The letter will inform the parties that their facility or property is located within the DWSMA, and that two of the source water aquifers are vulnerable to contamination from land surface activities. In addition, the letter will provide information about the Minnesota Technical Assistance Program (MNTAP), a non-profit organization that assists businesses in proper waste handling and management. Brochures and information pamphlets available through Hennepin County will also be included in the letters.

5.5.1.1 Source of Action

St. Louis Park Public Works and Community Development Departments

5.5.1.2 Cooperators

Owners, managers, and employees of facilities or businesses that use, store, generate, or sell agricultural chemicals.

5.5.1.3 Time Frame

First letters to be sent in 2007, and annually thereafter.

5.5.1.4 Estimated Cost

No new or additional costs are anticipated for this action. This task is expected to require four hours of city staff time per year.

5.5.1.5 Goal(s) Achieved

Informing these businesses and facilities of the vulnerability of the upper source water aquifers in their locale will encourage cooperation with applicable regulations, and may prevent accidental spills and releases of agricultural chemicals onto the ground and into the subsurface.

5.5.2 Turf Management

The City intends to continue promoting careful and appropriate turf management practices within the DWSMA. Currently, the City provides recommendations to its residents and local businesses on how often to apply and what kind of fertilizers to use. The City has developed a brochure on the topic for businesses that use or apply turf chemicals. The City will collaborate with applicable and similar Hennepin County programs. The City will also continue to post information related to proper turf management practices on the City's website.

5.5.2.1 Source of Action

St. Louis Park Wellhead Protection Manager

5.5.2.2 Cooperators

Hennepin County; Owners of properties with large lawn space

5.5.2.3 Time Frame

Ongoing

5.5.2.4 Estimated Cost

No new or additional costs are anticipated for this task. Brochures will be made available from the City free of charge, and no additional costs are necessary for the City's webpage.

5.5.2.5 Goals Achieved

These actions should prevent excessive application of chemicals onto the ground that could potentially migrate downward into the subsurface and impact source water aquifers.

5.6 Management of Wells

5.6.1 Promoting the Sealing of Unused, Poorly-Maintained, Damaged, or Abandoned Wells

The City will promote any well sealing or cost-sharing programs available through Hennepin County or the Minnesota Department of Health that assist or reimburse the costs and administration of sealing unused, poorly-maintained, damaged or abandoned private wells located within the DWSMA.

5.6.1.1 Source of Action

St. Louis Park Public Works Department

5.6.1.2 Cooperators

Hennepin County and/or other cooperating government agency

5.6.1.3 Time Frame

Beginning in 2007 and ongoing thereafter

5.6.1.4 Estimated Cost

This task is expected to require approximately 10 hours of city staff time per year. The City may consider participating in available, existing cost-sharing programs, and/or reimbursing a portion of the well sealing costs to local residents.

5.6.1.5 Goal(s) Achieved

This action will assist with the City's goal of eliminating potential pollutant sources to the vulnerable source water aquifers used for public water supplies. The number of wells in the DWSMA will be reduced.

5.6.2 Identifying New High-Capacity Wells and Changes to Appropriations of Existing High-Capacity Wells

City staff and the MDH and staff in the Source Water Protection Unit will coordinate efforts with the MN DNR Appropriations Program to identify proposed new, high-capacity wells in the DWSMA, and/or significant changes to existing Water Appropriation Permits for existing high-capacity wells. Proposed new high-capacity wells or changes to current Appropriation Permits will be evaluated by MDH staff to determine whether the proposed pumping will change the boundaries of the delineated WHPAs and corresponding DWSMA for the City's municipal wells. If identified, the City and the MDH and MN DNR staff will meet with the well owner(s) to inform them of the potential impacts the new or existing wells may have on the City's wellhead and source water protection efforts, and discuss responsibility for any changes that may be necessary.

5.6.2.1 Source of Action

St. Louis Park Public Works Department; MDH; MN DNR

5.6.2.2 Cooperators

Well owners, property/business owners, and local residents

5.6.2.3 Time Frame

Beginning at the time the Wellhead Protection Plan is approved (2006) and ongoing thereafter

5.6.2.4 Estimated Cost

No new or additional costs are anticipated. The city staff time and costs associated with this task are already allocated through existing City programs, projects, and budgets.

5.6.2.5 Goal(s) Achieved

This action will assist the City in identifying new wells proposed to be constructed in the DWSMA, and determine whether the pumping of new or existing wells will affect the City's Wellhead Protection Plan. This action will also provide opportunities to bring well owners into wellhead and source water protection educational programs.

5.6.3 Public Education

The City will mail MDH and Hennepin County pamphlets and brochures related to operating and maintaining wells to all identified well owners located in the DWSMA. The MDH pamphlets and brochures will include *The Well Owner's Handbook*, *Finding Lost Wells – Searching for Wells on a Property*, *Protecting Your Well*, *Sealing Unused Wells*, and *Safe Clean Drinking Water - Available Across Minnesota*. The documents will also be made available at City Hall. The MDH will be responsible for providing new well owners all applicable information and documents.

5.6.3.1 Source of Action

St. Louis Park Wellhead Protection Manager

5.6.3.2 Cooperators

MDH; Hennepin County; well owners within the DWSMA

5.6.3.3 Time Frame

To begin in 2007 and ongoing thereafter

5.6.3.4 Estimated Cost

The documents and materials will be provided, free of charge, from the MDH. Costs may include postage and city staff time. The city staff time required for this task will be incorporated through other existing city programs, projects, and budgets.

5.6.3.5 Goal(s) Achieved

This action will assist the City in identifying and educating well owners in the DWSMA about proper use and maintenance of wells. Proper operation and maintenance of wells will reduce the potential risk that these wells will become direct pathways for contamination of the source water aquifer(s).

5.7 Management of Facilities or Properties that Generate Hazardous Wastes or Use Hazardous Materials and Chemicals

The City intends to contact the MPCA, the state agency responsible for regulating and permitting hazardous waste generators, on an annual basis to

inquire about the status of hazardous waste users and generators located within the DWSMA. The City currently posts information regarding hazardous waste recycling and disposal on their website and provides informational brochures and pamphlets on the subject (“Recyclopedia” and “Hazardous Waste Collection”). The City also hosts a hazardous waste drop-off event for one weekend a year. In addition, the City intends to continue collaborating and cooperating with Hennepin County to promote recycling and proper management and disposal of hazardous wastes, materials, and chemicals.

5.7.1 Source of Action

St. Louis Park Public Works Department

5.7.2 Cooperators

MPCA staff; Hennepin County; businesses and residents that use or generate hazardous wastes, materials, or chemicals.

5.7.3 Time Frame

Some programs ongoing, other to begin in 2010 and conducted annually thereafter.

5.7.4 Estimated Cost

No new or additional costs are anticipated for this action. Time and costs associated with this task are already allocated through existing city programs, departments and budgets.

5.7.5 Goal(s) Achieved

The annual review of facilities classified as hazardous waste generators will ensure that improper handling and/or storage of wastes is not being conducted within the DWSMA. Potential impacts to the upper source water aquifers will be minimized or averted.

5.8 Other Public Education Programs

5.8.1 Publishing the Drinking Water Consumer Confidence Report

The City will continue distributing the *Drinking Water Consumer Confidence Report* (“Water Quality Report”) to all users of the St. Louis Park public water supply via the City’s website, newsletter, and local paper. The report provides information regarding the city’s public water supply system and its water quality.

5.8.1.1 Source of Action

St. Louis Park Public Works Department

5.8.1.2 Cooperators

None

5.8.1.3 Time Frame

Ongoing, annually distributed as required by federal regulations.

5.8.1.4 Estimated Cost

No new or additional costs are expected for this activity. The city staff time and costs associated with this task are already allocated through existing city programs, projects, and budgets.

5.8.1.5 Goal(s) Achieved

The general public will be more aware of the federal water quality requirements for public water supply systems, and the overall water quality of the city's public water supply.

5.8.2 Incorporating Wellhead and Source Water Protection into the City's Planning Process

The City will include a review of its Wellhead and Source Water Protection Plan as part of its normal zoning and land use planning processes. Copies of the Plan will be distributed to the City's Planner(s), Planning Commission, and Hennepin County. In addition, the City will evaluate the feasibility of creating an Overlay Zoning District corresponding to the DWSMA.

5.8.2.1 Source of Action

St. Louis Park Planning Commission and Community Development Department

5.8.2.2 Cooperators

St. Louis Park Planning Commission; St. Louis Park City Council

5.8.2.3 Time Frame

This will be an ongoing activity beginning in 2008.

5.8.2.4 Estimated Cost

No new or additional costs are anticipated. The city staff time and costs associated with this task are already allocated through existing city programs, projects, and budgets.

5.8.2.5 Goal(s) Achieved

Wellhead and source water protection efforts will be extended and incorporated into future planning for the city. Potential pollution risks to the public water supply system will be reduced.

5.8.3 Informational New Releases

The City will publish articles in the city newsletter and website, and the local newspaper pertaining to and providing information related to wellhead and source water protection, as well as potential contaminant source management such as wells, hazardous waste disposal, turf management, and others. The City will collaborate efforts with the policies, goals, and actions outlined in neighboring communities' wellhead protection plans and Hennepin County's management plan. Templates for the new releases will be provided by the MDH.

5.8.3.1 Source of Action

St. Louis Park Public Works Department

5.8.3.2 Cooperators

City staff; Local newspaper; MDH; Hennepin County

5.8.3.3 Time Frame

To begin in 2008 and as appropriate thereafter.

5.8.3.4 Estimated Cost

No new or additional costs are anticipated for this task. The city staff time and costs associated with completing this action are already allocated through other city programs, projects, and budgets.

5.8.3.5 Goals Achieved

The general public and property owners in the DWSMA as well as citywide, will become more aware of the City's wellhead and source water protection program, groundwater protection principles, and steps that everyone can take to protect the City's public water supply.

5.8.4 Collaboration with Neighboring Communities

Since nearly half of the St. Louis Park DWSMA is outside of the City's limits, the City will collaborate with neighboring communities. Specifically, the City will contact the designated Wellhead Protection Manager (or Public Works Director) for each city in which the DWSMA extends to share wellhead and source water protection information and ideas and discuss ways the cities can combine efforts, actions, and strategies to protect the regional source water aquifers, and save costs.

5.8.4.1 Source of Action

St. Louis Park Wellhead Protection Manager

5.8.4.2 Cooperators

Cities of Edina, Golden Valley, Hopkins, Medicine Lake, Minneapolis, Minnetonka, and Plymouth.

5.8.4.3 Time Frame

First contact to occur in 2007 and meetings as necessary thereafter.

5.8.4.4 Estimated Costs

Task will require approximately 8 hours per year for the City's Wellhead Protection Manager. No new or additional costs anticipated.

5.8.4.5 Goal(s) Achieved

The teamed efforts between neighboring communities that utilize the same regional source water aquifers should enhance the proposed protection measures, will facilitate better communication and information sharing between communities, and result in cost-effective and improved resource protection related to public water supply.

5.9 Additional Data Collection

5.9.1 Monitoring Static and Pumping Levels in Municipal Wells

The City will continue to routinely monitor and record the static and pumping levels of the groundwater in the municipal wells. Water levels in all the municipal wells will be recorded at least monthly.

5.9.1.1 Source of Action

St. Louis Park Public Works Department

5.9.1.2 Cooperators

None

5.9.1.3 Time Frame

Ongoing

5.9.1.4 Estimated Cost

No new or additional costs are anticipated for this task. The city staff time and costs associated with this activity are already allocated through existing city programs, projects, and budgets.

5.9.1.5 Goal(s) Achieved

By routinely recording the groundwater levels in the municipal wells, the city can monitor groundwater elevation trends over time. If the static water levels in the wells show a consistent decreasing trend, the city may pursue more restricted water use measures and/or more effective methods to control public water supply use. This data can also be useful to verify the groundwater flow fields in the source water aquifers.

5.9.2 Geologic and Hydrogeologic Studies and Data Gathering

The City intends to obtain additional geologic and hydrogeologic information and data regarding the St. Louis Park area. Specifically, the City will work with the MDH to have samples collected from municipal wells open to different bedrock aquifers to be tested for tritium and/or Carbon 14 isotopes. The City will also cooperate and collaborate with various groups conducting geologic or hydrogeologic studies as feasible and applicable.

5.9.2.1 Source of Action

St. Louis Park Wellhead Protection Manager

5.9.2.2 Cooperators

Agencies or groups conducting geologic or hydrogeologic studies, well drilling companies, and others.

5.9.2.3 Time Frame

Beginning in 2007 and ongoing thereafter.

5.9.2.4 Estimated Cost

No new or additional costs are anticipated for this task. The city staff time and costs associated with this activity are already allocated through existing city programs, projects, and budgets.

5.9.2.5 Goal(s) Achieved

By obtaining additional geologic and hydrogeologic information specifically focused on the St. Louis Park area, more accurate data will be available to delineate future, revised WHPAs and DWSMA(s) for the existing and proposed municipal wells. The additional isotope analyses will provide updated information on the vulnerability of the aquifers to land surface activities. This information will be valuable for future, required updates to this Plan. Updated and more accurate vulnerability assessments will also result.

5.9.3 Monitoring the Quality of the Public Water Supplies

The City intends to compile and track the levels of compounds and contaminants detected in the St. Louis Park public water supply and wells, specifically volatile organic compounds and polynuclear aromatic hydrocarbons. This data will be obtained from the MDH as it is collected as part of the required, routine sampling of the public water supply system.

5.9.3.1 Source of Action

St. Louis Park Public Works Department

5.9.3.2 Cooperators

MDH

5.9.3.3 Time Frame

Ongoing

5.9.3.4 Estimated Cost

No new or additional costs are anticipated for this task. The city staff time and costs associated with this activity are already allocated through existing city programs, projects, and budgets.

5.9.3.5 Goal(s) Achieved

Through compiling and assessing the quality of the groundwater used for public water supplies, the City will have a good understanding of whether the levels of identified contaminants are increasing or decreasing over time. This information will also allow the City to determine whether new impacts have occurred to the source water aquifer(s), and what remedial measures should be undertaken.

6.0 Evaluation Program

The success of the St. Louis Park wellhead protection management program must be evaluated in order to determine whether the Plan is actually accomplishing what the City set out to do. The following activities will be implemented to:

- Track the implementation of the objectives identified in Section 5.0 of this Plan;
- Determine the effectiveness of specific management strategies regarding the protection of the public water supply;

-
- Identify possible changes to these strategies which may improve their effectiveness; and
 - Determine the adequacy of financial resources and staff availability to carry out the management strategies planned for the coming year.
1. The City will continue to cooperate with the MDH in the annual monitoring of the water supply system to determine whether the management strategies are having a positive effect and to identify water quality problems that may arise that must be addressed.
 2. Members of the City staff, the governing authority, and the Wellhead Protection Manager will travel through the DWSMA on a regular basis to identify any changes in land use or potential contaminant source management practices which may adversely impact the public water supply.
 3. The City staff will meet on an as-needed basis, with a minimum of one annual meeting, to review the results of each strategy implemented during the previous plan year and identify and discuss whether modifications are needed for those strategies, and additional strategies for the coming year.
 4. The Wellhead Protection Manager will make an annual written report to the governing authority regarding progress in implementing the wellhead protection management objectives of this Plan. The annual reports will be compiled and used to review the overall progress in implementing source management strategies when the St. Louis Park Wellhead Protection Plan is updated in 10 years. A copy of the report will be sent to the MDH Source Water Protection Unit in St. Paul and another copy will be placed in the City's wellhead and source water protection file.

7.0 Alternative Water Supply; Contingency Strategy

The City of St. Louis Park has a *Water Contingency and Conservation Plan* that has been submitted and approved by the DNR, Division of Waters, Appropriation Permit Program. This approved Plan contains the required elements of the Minnesota Wellhead Protection Rule and is accepted as an equivalent to an Alternative Water Supply/Contingency Plan as defined in 4720.5280. Implementation of the Plan has begun with the aid and assistance of local emergency management agencies. A copy of the Plan and the DNR approval letter are provided in Appendix F.

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Figure 7 – PCSI Data – Medium Risk Sites

Figure 8 – PCSI Data – Low Risk Sites

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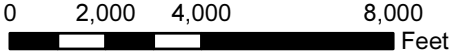
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WELLHEAD PROTECTION PLAN - PART II
St. Louis Park, Minnesota

DWSMA
and WHPA's

Figure
1

- Legend
- St Louis Park Municipal Wells
 - Municipal Boundaries
 - DWSMA
 - Inner Wellhead Management Zone
(1-Year WHPA)
 - 10-Year WHPAs









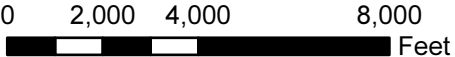
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- Legend**
-  St Louis Park Municipal Wells
 -  DWSMA
 -  Municipal Boundary
 - Vulnerability of St. Peter and Praire du Chien-Jordan Aquifers**
 -  High
 -  Moderate
 -  Low



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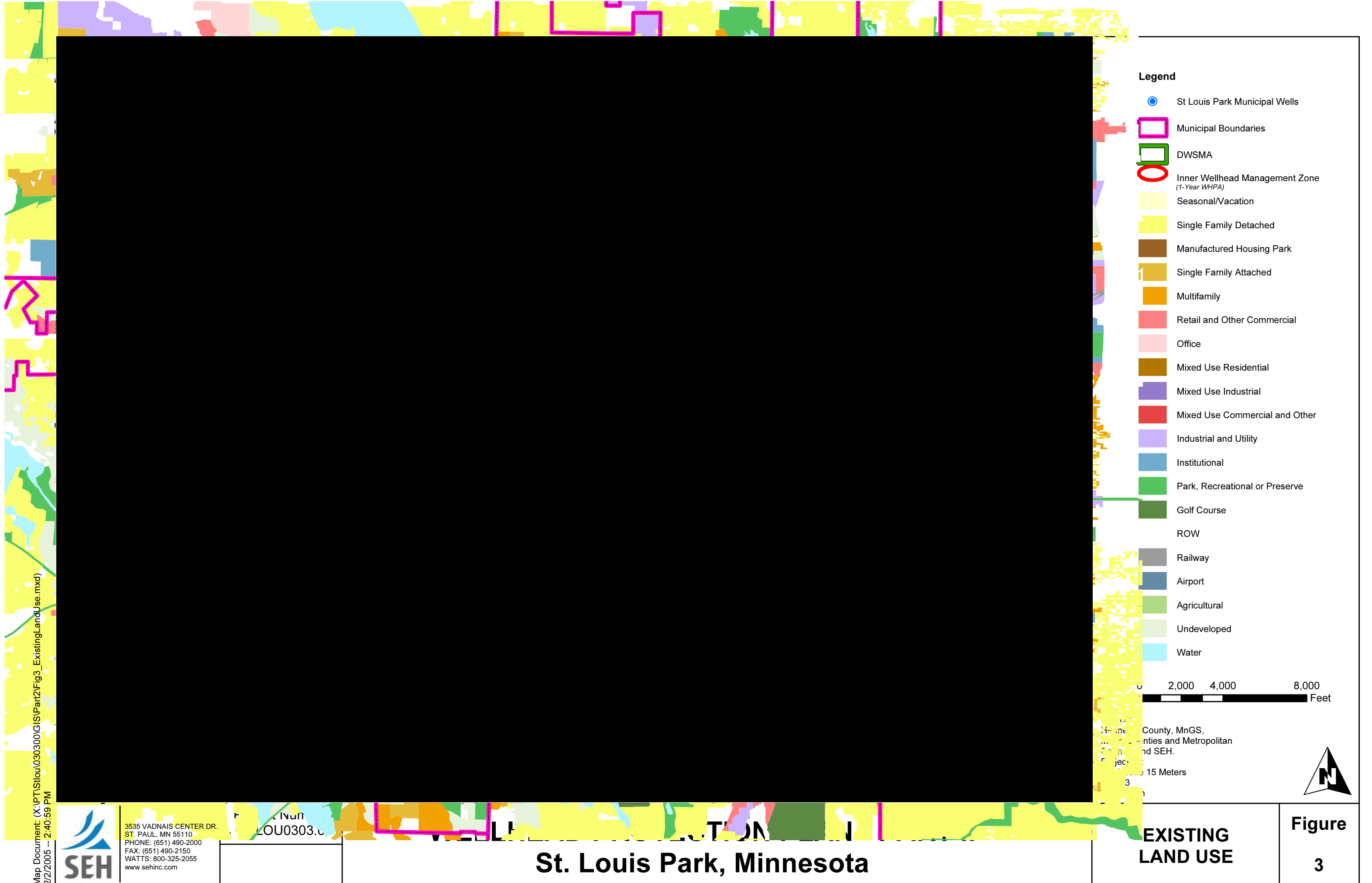
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WELLHEAD PROTECTION PLAN - PART II

St. Louis Park, Minnesota

**DWSMA
Vulnerability**

**Figure
2**





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WELLHEAD PROTECTION PLAN - PART II

St. Louis Park, Minnesota

Legend

- St Louis Park Municipal Wells
- Municipal Boundaries
- DWSMA
- Inner Wellhead Management Zone
(1-Year WHPA)
- Planned Land Use - Level 1 Classification**
 - Rural Residential
 - Single Family Residential
 - Multi-Family Residential
 - Commercial
 - Industrial
 - Mixed Use - Single Units
 - Multiple Uses - Several Units
 - Institutional
 - Park and Recreation
 - Open Space: Restricted Use
 - ROW
 - Railway Corridor
 - Vacant or No Data
 - Open Water

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Source:
Hennepin County, MnGS,
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Council, St. Louis and SEH.
Projection:
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**PLANNED
LAND USE
(2002-2020)**

**Figure
4**

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WELLHEAD PROTECTION PLAN - PART II

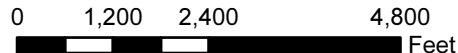
St. Louis Park, Minnesota

CURRENT
ZONING

Figure
5

Legend

- St Louis Park Municipal Wells
- Municipal Boundaries
- DWSMA
- Inner Wellhead Management Zone
(1-Year WHPA)
- Zoning**
- R1-Single Family Residential
- R2-Low Density Residential
- R3-Medium Density Residential
- R4-High Density Residential
- C1-Neighborhood Commercial
- C2-Highway Commercial
- IG-Industrial General
- IP-Industrial Park
- MX-Mixed Use
- O-Open Space
- RC-Recreational
- PUD
- PID



Source:
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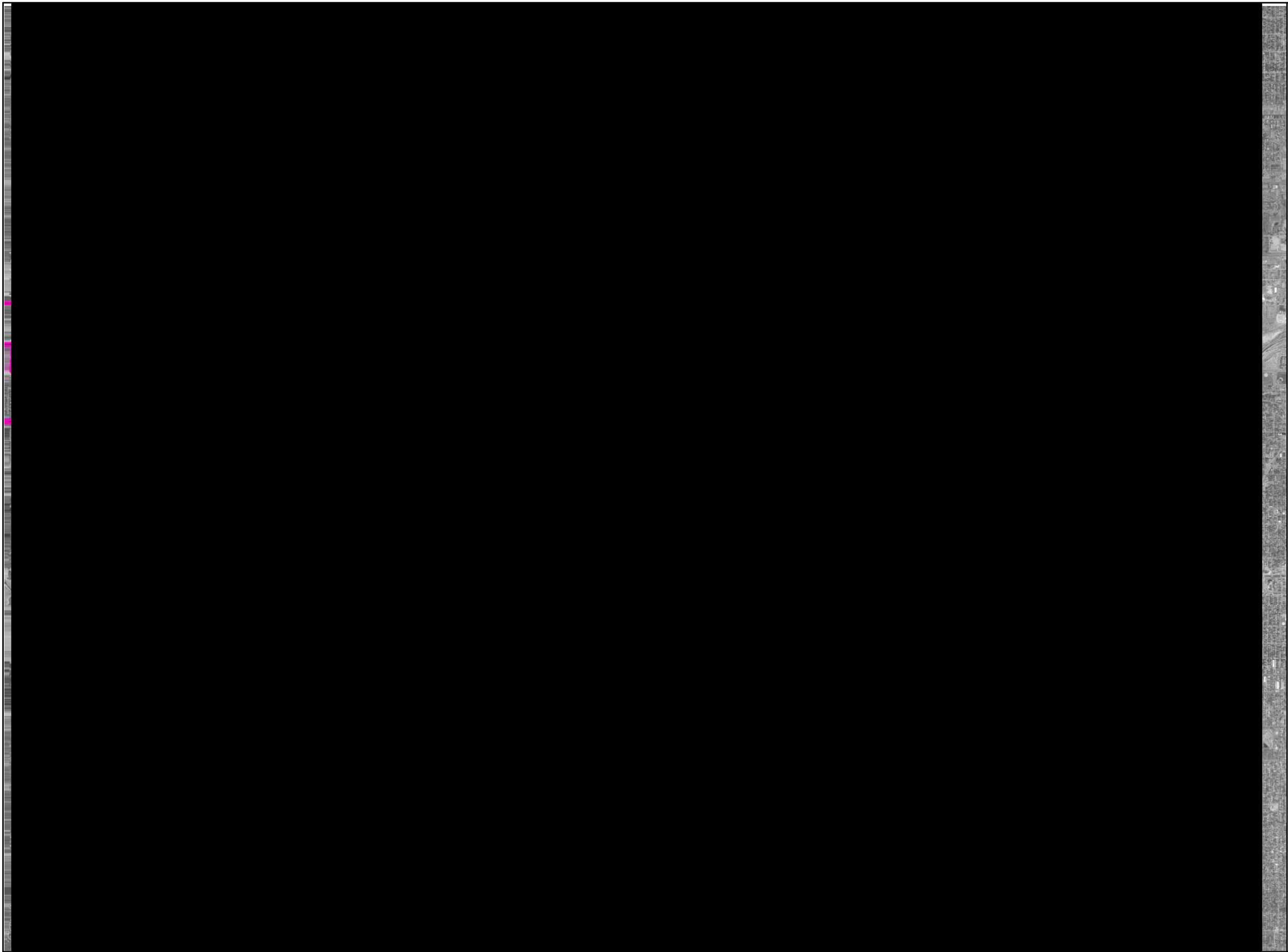
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WELLHEAD PROTECTION PLAN - PART II
St. Louis Park, Minnesota

PCSI DATA
HIGH RISK SITES

Figure
6



- Legend**
- St Louis Park Municipal Wells
 - Municipal Boundaries
 - DWSMA
 - Inner Wellhead Management Zone
(1-Year WHPA)
 - Vulnerability**
 - High
 - Moderate
 - Low
 - High Risk Sites**
 - Agricultural chemical sites
 - Leaking underground storage tank sites
 - Registered storage tank
 - Dump
 - Superfund site
No further remedial action planned
 - Voluntary investigation clean-up sites

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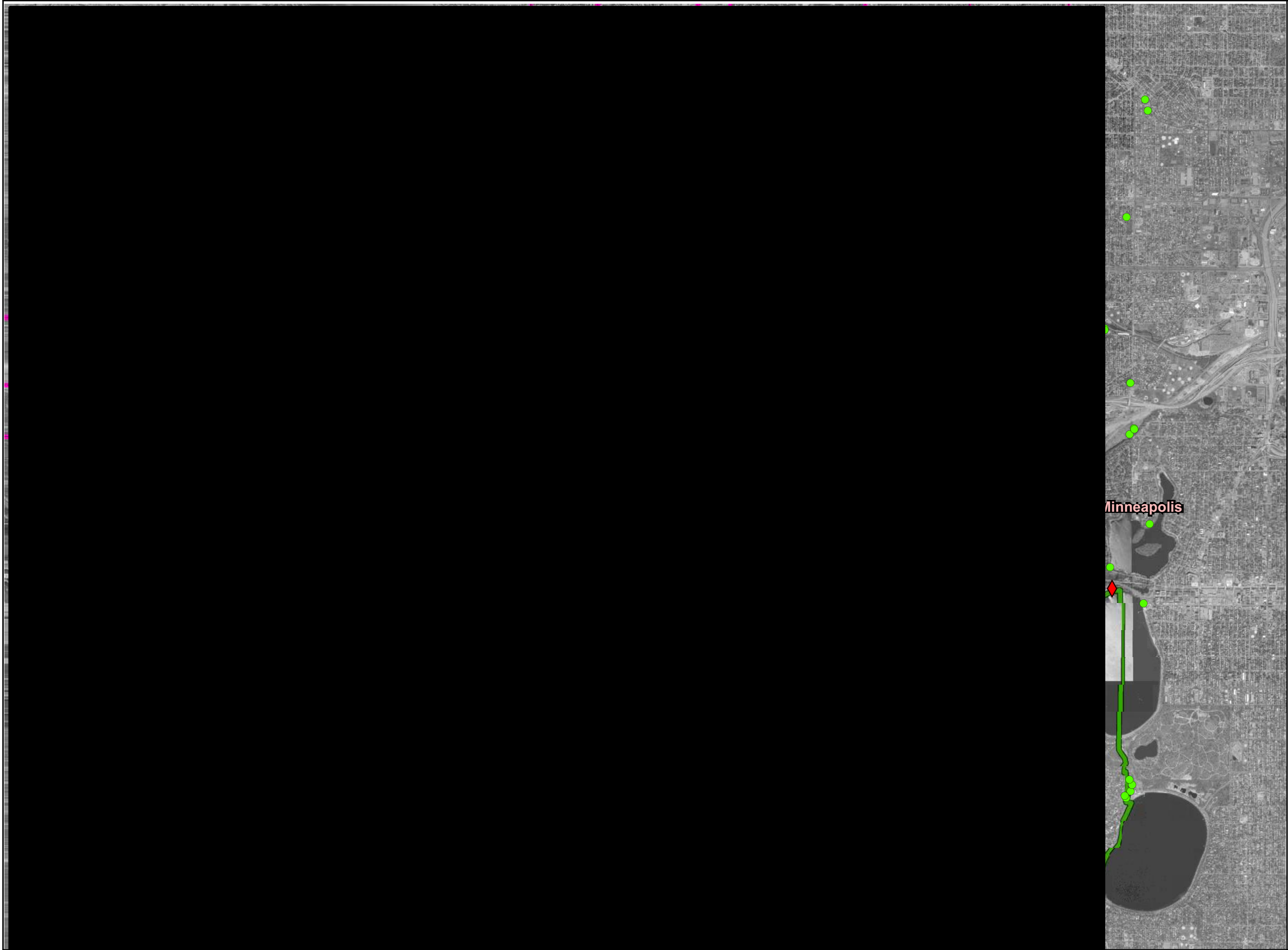
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WELLHEAD PROTECTION PLAN - PART II
St. Louis Park, Minnesota

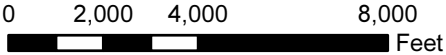
PCSI DATA
MEDIUM RISK SITES

Figure
7



Legend

- St Louis Park Municipal Wells
- Municipal Boundaries
- DWSMA
- Inner Wellhead Management Zone
(1-Year WHPA)
- Medium Risk Sites**
 - Golf course
 - Gravel pit
 - Toxic release site
 - Suspected hazardous waste site
 - National discharge site
 - Hazardous waste generator
 - CWI Wells



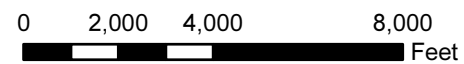
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- Legend**
- Municipal Wells
 - Municipal Boundaries
 - DWSMA
 - Emergency Management Zone (1-Year WHPA)
- Vulnerability**
- High
 - Moderate
 - Low
- Low Risk Sites**
- Church
 - Hospital
 - Hotel/Motel
 - Museum
 - Restaurant
 - School
 - Theater
 - Historical site
 - Garden
 - Nature reserve
 - Park
 - Resource management plan
 - Air release point
 - Bridge
 - Gage station
 - Seaplane landing area
 - Tower



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WELLHEAD PROTECTION PLAN - PART II

St. Louis Park, Minnesota

PCSI DATA
LOW RISK SITES

Figure
8

Appendix A

Part I Wellhead Protection Plan

Part I Wellhead Protection Plan

Wellhead Protection Area and Drinking Water Supply Management Area Delineations and Vulnerability Assessments

City of St. Louis Park, Minnesota
Public Water Supplier 1270050

SEH No. A-STLOU0303.00

February 2004

Wellhead Protection Area and Drinking Water Supply Management Area Delineations
and Vulnerability Assessments
Part I Wellhead Protection Plan
City of St. Louis Park, Minnesota
Public Water Supplier 1270050

SEH No. A-STLOU0303.00

February 2004

Craig L. Kurtz, PG
Sr. Hydrogeologist/Project Manager

Note: This report was printed on recycled paper.

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Part I Wellhead Protection Plan

Wellhead Protection Area and Drinking Water Supply Management Area Delineations and Vulnerability Assessments

Prepared for City of St. Louis Park
Public Water Supplier 1270050

1.0 Public Water Supply Profile

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2.0 Introduction

Short Elliott Hendrickson Inc.[®] (SEH) was retained by the City of St. Louis Park, Minnesota to assist in the development of the Wellhead Protection Plan for the City's public water supply (Public Water Supplier Identification Number 1270050). St. Louis Park is located within the seven-county, Twin Cities Metropolitan Area, in Hennepin County. The City's location and municipal wells are depicted in Figure 1.

This report is Part I of the Wellhead Protection Plan and its contents have been completed in accordance with the Minnesota Department of Health (MDH) Wellhead Protection Rules (MN Rules Chapter 4720). The Rules are based on the legal mandates from the 1986 and 1996 federal Safe Drinking Water Act and the 1989 Minnesota Groundwater Protection Act.

2.1 Purpose and Scope

The goal of Minnesota's Wellhead and Source Water Protection Program is to prevent human-derived contaminants from entering the source waters used for public water supplies. The City of St. Louis Park has initiated its Wellhead Protection Plan because of contamination of several public water supply wells from the Reilly Tar Superfund Site. The City has at least until June 12, 2006 to complete Parts I and II of its wellhead and source water protection planning.

This report, the first phase of the St. Louis Park Wellhead Protection Plan, addresses the delineations of the capture zones and the vulnerability assessments for 11 of its 15 existing public water supply wells. Four municipal wells are either planned to be sealed/abandoned or are used only as emergency backup wells. Specifically, this report summarizes the approach and results of delineating the Wellhead Protection Areas (WHPAs) and Drinking Water Supply Management Areas (DWSMAs) for Municipal Wells 3, 4, 6, 8, 10, 11, 12, 13, 14, 15 and 16. In addition, it includes vulnerability assessments for the 11 wells and their corresponding DWSMAs.

2.2 Background

The City has at least until June 12, 2006 to complete both parts of its Wellhead Protection Plan. The official Scoping I Meeting between city staff and MDH staff was held on June 18, 2002. The MDH *Initial Scoping Decision Letter* was dated July 11, 2002. The City mailed a *Notice of Plan Development Letter* to the neighboring communities, local units of government, and the MDH on July 15, 2002. A pre-delineation meeting between SEH staff and MDH staff was conducted on November 5, 2003.

2.3 Required Data Elements

In accordance with Minnesota Rules Chapter 4720.5400 and the July 11, 2002 Scoping Document, the following subsections discuss the required data elements for Part I of the Plan.

2.3.1 Physical Environment Data Elements

2.3.1.1 Precipitation

Precipitation is assumed not to directly influence the shape or extent of the WHPAs since the bedrock aquifers supplying the municipal wells are under confined hydrologic conditions. Therefore, precipitation has not been evaluated or studied as part of the WHPA or DWSMA delineations nor vulnerability assessments.

2.3.1.2 Geology

The local and regional geologic conditions are assumed to influence the delineation of the WHPAs and DWSMA of the St. Louis Park municipal wells. By characterizing the geologic and hydrogeologic conditions, the geometry, location, and magnitude of recharge and discharge areas, and groundwater flow directions of the bedrock aquifers supplying the municipal wells, can be determined. Therefore, through the use of well records and local and regional geologic studies and publications, the geologic and hydrogeologic conditions have been evaluated and reviewed for the WHPA

delineations and vulnerability assessments. The City does not have additional geologic information from records and/or borehole geophysical records from wells, borings, or exploration test holes, or additional information from surface geophysical studies.

2.3.1.3 Soils

Since the bedrock aquifers supplying the St. Louis Park municipal wells exhibit confined hydrologic conditions, soils are assumed not to directly influence the WHPAs. Therefore, soils have not been studied or reviewed as part of the WHPA delineations or vulnerability assessments.

2.3.1.4 Water Resources

Other than a general review of major and minor watershed units within and adjacent to the City, surface water resources have not been evaluated or studied in this Plan since the bedrock aquifers used for public water supplies exhibit confined hydrologic conditions.

2.3.2 **Land Use Data Elements**

2.3.2.1 Land Uses

Figures have been included in this Plan that show parcel and political boundaries as well as public land surveys including township, range, and sections. This information was primarily used to delineate the DWSMA. Specific land uses and zoning within and adjacent to the DWSMA will be evaluated and presented in Part II of the Plan.

2.3.2.2 Public and Private Utilities

Transportation routes and corridors have been incorporated into some of the figures of this Plan. Figures depicting pipelines and public drainage systems have not been included in this Plan since the bedrock aquifers supplying the municipal wells exhibit confined hydrologic conditions. However, figures depicting the City's storm sewers, sanitary sewers, and public water supply system may be included in Part II of the Plan.

Detailed information regarding the construction, maintenance, and use of the St. Louis Park municipal wells has been presented and evaluated in this Plan, and has been used in delineating the WHPAs and performing the vulnerability assessments.

High-capacity wells in the St. Louis Park area, in addition to the St. Louis Park municipal wells, likely influence the local groundwater flow fields of the source water bedrock aquifers. These wells could impact the delineations of the WHPAs, and have therefore, been reviewed and evaluated in this Plan.

2.3.3 **Water Quantity Data Elements**

2.3.3.1 Surface Water Quantity

Since the source water bedrock aquifers supplying the municipal wells exhibit confined hydrologic conditions, local lakes, creeks, streams, ditches, wetlands, and other relatively shallow surface water bodies are assumed not to directly influence the WHPAs. The withdrawal of groundwater from the source water bedrock aquifers in St. Louis Park for public water supplies does not appear to impact or influence local surface water bodies. For model

calibration purposes, deeper lakes and regional rivers were incorporated into the groundwater flow model used to delineate the WHPAs, because they are regional groundwater flow boundaries. The City is unaware of any local water-use conflicts regarding the pumping from its municipal wells.

2.3.3.2 Groundwater Quantity

The City of St. Louis Park utilizes the St. Peter, the Prairie du Chien-Jordan, and the Mount Simon-Hinckley bedrock aquifers for public water supplies. Municipal Well 3 is only open to the St. Peter Aquifer. Municipal Wells 11, 12, 13, and 17 are open only to the Mount Simon-Hinckley Aquifer. All other St. Louis Park municipal wells are open to the Prairie du Chien-Jordan Aquifer.

The Franconia-Ironton-Galesville bedrock aquifer also exists in the area. It is stratigraphically between the Prairie du Chien-Jordan and the Mount Simon-Hinckley aquifers. A water table aquifer and possibly a buried drift aquifer may also be present above the St. Peter Sandstone bedrock aquifer. The presence of these additional aquifers will not directly influence the delineation of the WHPAs nor the vulnerability assessments, since the source water, bedrock aquifers (the St. Peter, the Prairie du Chien-Jordan, and the Mount Simon-Hinckley) exhibit confined hydrologic conditions in the St. Louis Park area.

The Minnesota Geological Survey (MGS) County Well Index (CWI) and the Minnesota Department of Natural Resources (MDNR) State Water Use Database System (SWUDS) were utilized to identify and quantify high-capacity wells and local groundwater uses that could influence and affect the groundwater flow field and related WHPA delineations. Databases of groundwater elevations at local wells were obtained from the Minnesota Pollution Control Agency (MPCA) and were used in calibrating the groundwater flow model. In addition, pumping records from the City were used to determine the average and highest annual pumping volumes and rates of municipal wells.

2.3.4 Water Quality Data Elements

2.3.4.1 Surface Water Quality

Since the source water aquifers used for the City's public water supply exhibit confined hydrologic conditions, the quality of local and regional surface water bodies is assumed to not directly influence or affect the WHPA or DWSMA delineations nor the vulnerability assessments.

2.3.4.2 Groundwater Quality

Regionally, the quality of the groundwater from the St. Peter, Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers is generally good. Although the Prairie du Chien formation is typically more sensitive to human activity at the land surface due to its fractured nature, the Jordan Sandstone has good quality water with low concentrations of dissolved solids compared to other local aquifers. However, locally the Prairie du Chien-Jordan aquifer has been significantly impacted and contaminated by the Reilly Tar Superfund Site located in St. Louis Park. Several of the City's municipal wells (Wells 4, 5, 6, 7, 9, 10, and 15) have been contaminated by polycyclic

aromatic hydrocarbons (PAHs). Due to this contamination, some of wells have been removed from the public water supply system (Wells 5, 7, and 9), and others (Wells 4, 10, and 15) have been retrofitted with granulated active carbon (GAC) filtration treatment systems to remove the PAHs. Municipal Well 6 is not currently used.

Samples from the St. Louis Park municipal wells and public water supply system are routinely collected and analyzed by the MDH as required under the Minnesota Public Water Supply Program and the federal Safe Drinking Water Act. The samples are tested for microorganisms, inorganic compounds, organic chemicals, pesticides and herbicides, and radioactive contaminants. In addition, the municipal wells not affected by the Reilly Tar Site contamination are monitored for PAHs annually. The municipal wells impacted by PAHs are treated by GAC are sampled and tested quarterly. The St. Louis Park 2002 Drinking Water Consumer Confidence Report for the public water supply system is provided in Appendix A.

According to the 2002 Drinking Water Consumer Confidence Report, no contaminants were detected at levels that violated federal drinking water standards. However, some contaminants were detected in trace amounts that were below legal limits. These trace contaminants include: alpha emitters, arsenic, barium, combined radium, fluoride, radon, lead, copper, sodium, sulfate, nitrate, total trichloroethylene, trichloroethylene, cis-1,2-dichloroethylene and trans-1,2-dichloroethylene.

3.0 Physiographic Conditions

The following resources were used to review, assess and define the geologic, hydrogeologic, and hydrologic conditions in the St. Louis Park area:

- *Geologic Atlas of Hennepin County, Minnesota*, 1989; County Atlas Series C-4; Minnesota Geological Survey-University of Minnesota.
- *Hydrogeologic Framework and Properties of Regional Aquifers in the Hollandale Embayment, Southeastern, Minnesota*, 1986; Hydrologic Investigations Atlas HA-677; U.S. Geological Survey.
- *Geologic Factors Affecting the Sensitivity of the Prairie du Chien-Jordan Aquifer*, 1991; Minnesota Geological Survey.
- *Effects of Present and Projected Groundwater Withdrawals on the Twin Cities Aquifer System, Minnesota*, 1990; U.S. Geological Survey, MN Department of Natural Resources, and the Metropolitan Council.
- *Overview of the Twin Cities Metropolitan Groundwater Model*, July 2000; Minnesota Pollution Control Agency.
- *Hydrogeology of the Paleozoic Bedrock in Southeastern Minnesota*, 2003; Minnesota Geological Survey – University of Minnesota.

3.1 Regional and Local Geology

The sedimentary bedrock of east-central and southeastern Minnesota was formed by several periods of Early Paleozoic marine deposition. Layers of sediments were deposited by the transgression and regression of an inland sea during the Late Cambrian to Middle Ordovician. The general dip of the

sedimentary bedrock is toward Minneapolis, which is near the center of the Twin Cities.

Generally, the depth to bedrock in the St. Louis Park area ranges from 50 to 100 feet. However, there are areas surrounding St. Louis Park in which the depth to bedrock is 100 to 200 feet. The top of bedrock elevation ranges from 700 to 800 feet above mean sea level (MSL). According to the well records of the St. Louis Park municipal wells, bedrock was encountered at depths ranging from 69 (Municipal Well 9) to 127 feet (Municipal Well 12). Figures 2 and 3 are generalized geologic cross-sections through the St. Louis Park area. Figure 4 depicts the uppermost bedrock conditions in the St. Louis Park area and Figure 5 is a typical stratigraphic column for the St. Louis Park area.

The uppermost bedrock in the St. Louis Park area is typically the Platteville and Glenwood Formations overlying the St. Peter Sandstone. The bedrock formations beneath the St. Peter Sandstone are (in descending order): the Prairie du Chien Group, the Jordan Sandstone, the St. Lawrence Formation, the Franconia Formation, the Ironton and Galesville Sandstones, the Eau Claire Formation, and the Mount Simon and Hinckley Sandstones.

The Platteville Formation is a fine-grained limestone containing thin shale partings near its top and base. It is underlain by the 0 – 5 feet thick, green sandy shale of the Glenwood Formation.

The upper half to two-thirds of the St. Peter Sandstone consists of fine- to medium-grained, friable quartz sandstone. The lower part of the formation contains multi-colored beds of mudstone, siltstone, and shale with interbedded very coarse sandstone. The typical thickness of the St. Peter Sandstone in Hennepin County is approximately 160 feet.

The Prairie du Chien Group is a dolostone that is sandy with minor amounts of shale in the upper third to half, and less sandy in the lower part. The formation is thin-bedded and contains thin beds of sandstone in the upper part, but is more massive- and thick-bedded in the lower part. Regionally, it is typically about 120 feet thick.

Below the Prairie du Chien Group is the Jordan Sandstone, a quartzose sandstone approximately 95 feet thick. The upper and middle portions of this formation are comprised of medium- and coarse-grained sandstone. The lower portion is massively bedded.

The St. Lawrence Formation, a dolomitic siltstone and shale is below the Jordan Sandstone, and overlies the Franconia Formation, a fine-grained sandstone and shale. Beneath the Franconia Formation are the Ironton and Galesville Sandstones. The Ironton Sandstone is a silty, fine- to coarse-grained sandstone that is underlain by the Galesville Sandstone, a fine- to medium-grained sandstone containing interbedded shale.

The Eau Claire Formation underlies the Galesville Sandstone and overlies the Mount Simon Sandstone. It is a siltstone and shale with minor amounts of very fine to fine sandstone. The Mount Simon Sandstone contains varying amounts of siltstone and shale in the upper third of the formation. The middle part consists of friable medium- to coarse-grained sandstone, and the

lower 10-30 feet is silty, poorly-sorted, and commonly pink or light red. The base of the deposit consists of very coarse to pebble-size grains of quartz.

The unconsolidated Quaternary deposits overlying bedrock in St. Louis Park mainly consist of glacier-derived deposits. These deposits consist mostly of outwash deposits from of the Des Moines Lobe and Grantsburg Sublobe Deposits. The outwash is comprised of sand, loamy sand, and gravel, overlain by loess less than four feet thick. There are also areas of organic deposits comprised of peat and organic-rich sediment that include small bodies of open water. Some of the organic deposits have been drained and filled.

There are no significant bedrock valleys present within or immediately adjacent to the City.

3.2 Regional and Local Hydrogeology

In the St. Louis Park area, the water table aquifer is present within the unconsolidated glacial deposits overlying bedrock. The water table aquifer is unconfined and is present within the shallow glacial deposits that readily transmit water (i.e. sands and gravels). A laterally-extensive, buried glacial aquifer does not exist in the glacial overburden in this area due to the lack of very fine-grained deposits of enough thickness to hydraulically separate the deeper glacial deposits from the shallow, overlying, unconfined water table aquifer.

Typically, groundwater flow in the water table aquifer is highly influenced, controlled by, and connected to local surface water bodies. Regionally, groundwater flow in the water table aquifer in the St. Louis Park area is east and south toward the Mississippi River according to the Hennepin County Geologic Atlas. The water table aquifer is separated hydraulically from the deeper bedrock aquifers by the shaley deposits of the Platteville and Glenwood Formations, where present.

The uppermost, source water, bedrock aquifer in the St. Louis Park area is the St. Peter Aquifer. In St. Louis Park, the groundwater flow direction of this aquifer is east and south toward the Mississippi River. Recharge to this aquifer generally occurs from groundwater infiltration from overlying and underlying formations/deposits.

The next source water, bedrock aquifer is the Prairie du Chien-Jordan Aquifer. In the region of St. Louis Park, this aquifer typically has a yield of 1,000 to 2,000 gallons per minute and flows southeasterly according to the Hennepin County Geologic Atlas. The Prairie du Chien-Jordan Aquifer is not present in the northwestern portion of Hennepin County where the Prairie du Chien Group and the Jordan Sandstone are absent due to erosion.

Groundwater in the Prairie du Chien Group is concentrated within and controlled by the fractures, joints, and solution cavities in the formation. In contrast, groundwater in the Jordan Sandstone is dominantly controlled by intergranular flow through the highly permeable, fairly uniform, quartzose sandstone. No extensive confining unit exists between the Prairie du Chien Group and the Jordan Sandstone, and they are therefore, regionally defined as one, hydraulically connected aquifer. However, recent studies indicate that

the lower portion of the Prairie du Chien Group, called the Oneota Dolomite, is a semi-confining unit that hydraulically separates the Prairie du Chien Group from the Jordan Sandstone in some areas of Minnesota.

Groundwater flow in the Prairie du Chien-Jordan Aquifer is southeastward toward the Minnesota and Mississippi Rivers - regional discharges for the aquifer. The aquifer is mainly recharged by precipitation infiltration from overlying deposits and formations in the central portion of Hennepin County, where the Prairie du Chien Group and Jordan Sandstone formations subcrop beneath the glacial deposits. This aquifer is vertically bounded and confined by the basal portion of the St. Peter Sandstone above and the shaley St. Lawrence Formation below.

The Mount Simon-Hinckley Aquifer is typically comprised of two sandstone formations – the Mount Simon Sandstone, which ranges in thickness from about 125 to 270 feet, and the Hinckley Sandstone, which is absent in most of the county, but occurs as remnants several tens of feet thick. In St. Louis Park, groundwater flow direction in this aquifer is currently southeastward toward a cone of depression caused by major pumping centers in the vicinity of the City of Minneapolis. Most of the groundwater in this aquifer was originally derived from leakage through overlying aquifers and lateral recharge from outside Hennepin County where the formation outcrops and subcrops beneath glacial deposits. The aquifer is strongly confined hydrologically by the Eau Claire Formation.

Chemical analyses (i.e. tritium or Carbon-14 dating) of the groundwater in the source water aquifer have not been recently conducted. Historical isotope testing at Municipal Wells 6 and 14 in 1991 detected tritium levels of 8.0 and 10.1 TU, respectively. Results of Carbon-14 age dating indicated that the groundwater in Municipal Wells 11, 12, 13, and 17 (Mount Simon-Hinckley Aquifer) is ancient, and the groundwater in Municipal Well 14 is modern (Prairie du Chien-Jordan Aquifer).

4.0 WHPA and DWSMA Delineations

4.1 Data Elements Assessment

4.1.1 Municipal Wells and Public Water Supply

The City of St. Louis Park currently has 15 municipal wells. Municipal Wells 5, 7, and 9 are out of service and are going to be properly sealed in the future. Municipal Well 17 is a standby well and is only used for emergencies. Municipal Wells 3 and 6 are also standby wells, but they have been used recently and have therefore, been included in this Plan. The locations of the municipal wells are depicted in Figure 1. The specifications and characteristics of each well are summarized in Table 1. Copies of the MDH Well Records for each well are included in Appendix B.

A summary of the annual groundwater production and use from 1998 through 2002 is provided in Table 2. This data was obtained from the City's records.

The 2002 population of St. Louis Park was 44,126. The City is completely developed and the population is not expected to significantly increase in the next ten years or the life of this Plan. Demand for public water supplies is

also not expected to significantly increase. Currently, the firm capacity of the City's public water supply system is 13,330,000 gallons per day. The City believes it will be able to meet its demand for public water supplies over the next 10 years or the life of this Plan.

4.1.2 Wellhead Protection Area Criteria

The following subsections discuss in detail the Wellhead Protection Area (WHPA) criteria used to delineate the WHPAs for each of the municipal wells, as specified in Minnesota Rules Chapter 4720.5510.

4.1.2.1 Time of Travel

The WHPAs (capture zones of the wells) for the municipal wells have been delineated to a maximum ten-year travel time. The one- and five-year travel time WHPAs have also been delineated and are shown in the figures.

4.1.2.2 Hydrologic Flow Boundaries

As previously discussed in Section 3.2, the St. Peter, the Prairie du Chien-Jordan, and the Mount Simon-Hinckley aquifers appear to be confined from other aquifers by the shale deposits of the Platteville and Glenwood Formations, the basal portion of the St. Peter Sandstone, and the Eau Claire Formation. The St. Lawrence Formation and the Eau Claire Formation hydrologically separate the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifer from the Franconia-Iron-Galesville bedrock aquifer.

Groundwater recharge to the bedrock aquifers originates from downward vertical leakage through the overlying glacial deposits where the bedrock units subcrop. Regional recharge to the aquifers also occurs where the bedrock formations outcrop along and intersect major river valleys. The regional rivers, assumed to be hydrologically connected with the bedrock aquifers in St. Louis Park include the Minnesota River to the south and the Mississippi River to the east.

Groundwater flow in the bedrock aquifers is influenced by local and regional pumping from private and public high-capacity wells. Other than St. Louis Park's municipal wells, wells with significant pumping rates were identified within the city's limits. In addition, high-capacity wells were identified in neighboring communities. The pumping of these wells appears to affect the local groundwater flow field. Therefore, these high-capacity wells have been incorporated into the groundwater flow model and are summarized in Table 3.

4.1.2.3 Daily Volumes

The historical (1998-2002) and projected (2007) pumping volumes for each of the municipal wells are summarized in Table 2. The historical data was obtained from the City. The projected volumes (1% increase per year) are based on the City's estimates. St. Louis Park is fully-developed and the demand for public water supplies is not expected to increase. The highest volumes for each well in Table 2 have been highlighted. These volumes were converted to pumping rates to be used in the groundwater flow model. Municipal Wells 10 and 15 do not pump at the same time. Therefore, for

modeling purposes, all of the pumping was assumed to come from Municipal Well 10 as a conservative approach.

4.1.2.4 Groundwater Flow Field

Groundwater flow in the St. Peter Aquifer in St. Louis Park is east and south toward the Mississippi River. According to the 1989 Hennepin County Geologic Atlas, the central portion of the county is a groundwater high and recharge area for the St. Peter and Prairie du Chien-Jordan aquifers. In the vicinity of St. Louis Park, groundwater flow in the Prairie du Chien-Jordan Aquifer is also moving east-southeastward toward the Mississippi River. Near high-capacity wells, the flow fields are locally altered toward each well when they are pumping.

4.1.2.5 Aquifer Transmissivity

According to the 1986 U.S.G.S. publication, *Hydrogeologic Framework and Properties of Regional Aquifers in the Hollandale Embayment, Southeastern Minnesota*, the transmissivity of the St. Peter Aquifer is 1,000 to 3,000 ft²/day in the Twin Cities area. Permeability values are estimated to be 20 ft/day.

Numerous aquifer pumping tests have been conducted in Minnesota on the Prairie du Chien-Jordan Aquifer. Several tests have been conducted in the vicinity of St. Louis Park. Table 4 summarizes the results of the Prairie du Chien-Jordan pumping tests near St. Louis Park. Based on these tests, the mean and median transmissivities for the aquifer are 14,223 ft²/day and 12,609 ft²/day, respectively. The MDH maintains a database of aquifer pumping tests performed on the Prairie du Chien-Jordan aquifer. The mean transmissivity value from this database is 19,395 ft²/day (1,802 m²/day). One standard deviation from the mean results in a transmissivity range of 6,190 to 60,780 ft²/day. This range was used to delineate the WHPAs for Municipal Wells 4, 6, 8, 10, 14, 15, and 16.

In October 2003, an aquifer pumping test for the Mount Simon-Hinckley Aquifer was conducted by the City in accordance with the Wellhead Protection Rules (MN Rules Chapter 4720.5510-4720.5540). MDH staff approved the Aquifer Test Plan submitted on September 12, 2003. The test was conducted using Municipal Wells 11 and 17 (Minnesota Unique Well Numbers 206439 and 147459, respectively). The report summarizing the test was submitted to MDH staff on October 15, 2003 and is included in Appendix C.

Based on the results of the test, the representative transmissivity for the Mount Simon-Hinckley Aquifer in the vicinity of St. Louis Park was determined to be 1,970 ft²/day (183 m²/day). This aquifer transmissivity was utilized in the groundwater flow model developed to delineate the WHPAs for Municipal Wells 11, 12, 13, and 17.

4.1.3 **Quantity and Quality of Groundwater Supplying the Municipal Wells**

The public water supply for St. Louis Park is regularly sampled and tested for contamination as regulated under the federal Safe Drinking Water Act.

As discussed in Section 2.3.4.2, following treatment, contaminants were not detected above regulatory standards in 2002.

No significant surface water bodies exist in the City. Due to its vulnerability to contamination, the St. Peter Aquifer is limited as a source water aquifer for the City. The Prairie du Chien-Jordan Aquifer is a viable source for public water supplies in the St. Louis Park area. There have been no reported cases of significant well interference issues or groundwater use conflicts related to the St. Louis Park municipal wells. However, locally, this aquifer has also been significantly impacted by the Reilly Tar Superfund Site. Levels of PAH compounds above regulatory limits have been detected in the St. Louis Park municipal wells.

The Franconia-Ironton-Galesville bedrock aquifer is present in the region and could be a secondary source of public water supplies. However, the capacity of this aquifer is presumably lower, the cost to develop wells in these aquifers may be higher, and the water quality is potentially not as favorable as the other bedrock aquifers.

Under the current regulatory, political and hydrogeologic conditions, the Mount Simon-Hinckley Aquifer, the deepest viable bedrock aquifer, is not a potential future source of groundwater. New wells cannot be completed in this aquifer.

The City does not anticipate the need to construct additional wells in the next 10 years or the life of this Plan. The development of St. Louis Park is complete and the demand for public water supplies is not expected to significantly increase.

4.1.4 Land and Groundwater Uses

Since the source water aquifers supplying groundwater to the St. Louis Park municipal wells exhibit confined hydrologic conditions, land uses are assumed not to directly influence the delineation of the WHPAs or DWSMA. However, land uses have a high potential impact the quality of the source water aquifers, and will therefore, be reviewed and evaluated in Part II of the St. Louis Park Wellhead Protection Plan.

As previously discussed and summarized in Table 3, several high-capacity wells were identified in the City and in communities neighboring St. Louis Park. These wells were identified and incorporated into the groundwater flow model developed and used to delineate the WHPAs and DWSMA.

4.2 Conceptual Groundwater Flow Model

The hydrogeologic conceptual model of the St. Peter and Prairie du Chien-Jordan aquifers is a two-layer system. The two aquifers are assumed to be mostly confined; however, groundwater leakage from the base of the St. Peter Sandstone into the top of the Prairie du Chien Group is thought to occur. Regionally, the Prairie du Chien Group and the Jordan Sandstone are assumed to be hydrologically connected and are considered here as one aquifer unit. The bedrock formations are assumed to be laterally continuous and have consistent thicknesses within the St. Louis Park area. The main mechanism for recharge to the aquifers is from overlying deposits. The base

of the Prairie du Chien-Jordan Aquifer is the St. Lawrence Formation, and leakage out of the Jordan Sandstone into the St. Lawrence Formation is considered here as insignificant. Groundwater flow in both aquifers is assumed to be east and southeast toward the Mississippi River.

The Mount Simon-Hinckley Aquifer is strongly confined by the Eau Claire Formation above and Precambrian basement crystalline bedrock underneath. Therefore, the conceptual model for the aquifer is a one-layer system. Leakage into the layer from the overlying Franconia-Ironton-Galesville is relatively small, and leakage out of the bottom of the Mount Simon-Hinckley is assumed here to be insignificant.

4.3 Groundwater Flow Modeling

Two computer-generated, steady-state, groundwater flow models were developed to delineate the WHPAs for Municipal Wells 3, 4, 6, 8, 10, 11, 12, 13, 14, 15 and 16. One model represents the St. Peter and Prairie du Chien-Jordan aquifers. The second model simulates the Mount Simon-Hinckley Aquifer. The following sections describe in detail the methods, construction, development, refinement, calibration, and results of the St. Louis Park groundwater flow models.

4.3.1 Method

The Multi-Layer Analytic Element Method (MLAEM[®]) groundwater modeling software (Version 5.1.08 DEV) was utilized for delineating the WHPAs. In addition, the electronic datasets from the MPCA's Version 1.00 July 2000 *Northwest Province, Layers 1, 2, and 3 Model of the Metropolitan Area Groundwater Model* and the Version 1.00, November 2000, *Lower Aquifers Model Layers 4 and 5* (Metro Models) were used as the framework for the St. Louis Park groundwater flow models.

The Metro Models were used for the large-scale model polygon mesh and simulation of regional groundwater flow fields and macro-model hydrogeologic properties. The simulated groundwater flow fields in the St. Louis Park area, and local hydrogeologic parameters, were refined and calibrated based on unique and specific hydrogeologic data obtained from the MDH, the MGS, the MPCA, the Hennepin County Conservation District groundwater flow model, the City, and information and data gathered by SEH during the course of this project.

4.3.2 Development, Refinement, and Calibration

For a complete and detailed description, explanation, and discussion of the Metro Model, please refer to the July 2000 MPCA report titled *Overview of the Twin Cities Metropolitan Groundwater Model*, by John K. Seaberg; the July 2000 MPCA report titled *Northwest Province, Layers 1, 2, and 3 Model*, by John K. Seaberg and Douglas D. Hansen; and the November 2000 MPCA report titled *Lower Aquifers Model Layers 4 and 5*, by Douglas D. Hansen and John K. Seaberg.

The models were developed using a UTM, Zone 15, NAD 83 metric coordinate system. The features of the models are depicted in Figures 6, 7, and 8, and the global and local hydrogeologic properties used in the models are presented in Table 5. Layer 5 of the Metro Model, simulating the Mount

Simon-Hinckley Aquifer, was extracted and converted into a single layer model, specific for St. Louis Park.

4.3.2.1 St. Peter and Prairie du Chien-Jordan Aquifers

Layer 1 of the Metro Model, representing the aquifer in the glacial deposits above the St. Peter Sandstone in Hennepin County, was made featureless since it was assumed to have only indirect hydraulic influence on the St. Peter and Prairie du Chien-Jordan aquifers. The St. Peter Aquifer was simulated in the model as Layer 2. The Prairie du Chien Group and Jordan Sandstone were modeled as a single hydrologic layer (Layer 3) with no significant differences in head or hydrogeologic properties between the two units. The modeling features of Layer 2 are depicted in Figure 6 and the features of Layer 3 are shown in Figure 7. The hydrogeologic properties used in the model are summarized in Table 5.

A leaky area representing the basal St. Peter Sandstone, was added between Layer 2 (the St. Peter Aquifer) and Layer 3 (the Prairie du Chien-Jordan Aquifer). This area was given a resistance of 40,000 days based on the Hennepin County Conservation District groundwater flow model. The area of leakage between the two layers was distributed through a polygon (identified as “Leaky 1”) created from several of the Metro Model polygons. The extent of the leakage area was based on where the St. Peter Sandstone was generally present.

Due to excessively high heads in Polygon “WH-14”, in Layer 2 caused by the removal of the given strength varel, the infiltration rate into the polygon was reduced from 5.74×10^{-4} m/day to 3.8×10^{-4} m/day.

The global transmissivity of the St. Peter Sandstone in the Metro Model (Layer 2) is $95.7 \text{ m}^2/\text{day}$. The global transmissivity of the Prairie du Chien-Jordan Aquifer in the Metro Model (Layer 3) is $720 \text{ m}^2/\text{day}$. Polygons were added to both layers of the model to incorporate changes in the hydrogeologic conditions and properties (“inhomogeneities”) in the vicinity of St. Louis Park. The inhomogeneity polygon in Layer 2 used Polygon “WH-15” of the Metro Model. The inhomogeneity polygon in Layer 3 (identified as “StLouPoly”) included Polygons “WH-10”, “WH-11”, “WH-15”, “WH-16”, and “WH-17”, and portions of Polygons “WH-7” and “WH-18” of the Metro Model. Both polygons completely encompassed the City.

Within the inhomogeneity of Layer 2, permeabilities of 3.3 m/day (transmissivity of $95.7 \text{ m}^2/\text{day}$) and 9.6 m/day ($278.4 \text{ m}^2/\text{day}$) were used based on the published range in the U.S.G.S. report titled *Hydrogeologic Framework and Properties of Regional Aquifers in the Hollandale Embayment, Southeastern Minnesota*. Within the inhomogeneity of Layer 3, permeabilities of 9.6 m/day (transmissivity of $576 \text{ m}^2/\text{day}$) and 94.1 m/day (transmissivity of $5,646 \text{ m}^2/\text{day}$) were used based on the range from the MDH database of Prairie du Chien-Jordan Aquifer pumping tests (please refer to Section 4.1.2.5). The two permeability scenarios were used to delineate two capture zones for each municipal well. The two capture zones were then combined to develop a single composite WHPA for each well (please refer to Section 4.5).

The thicknesses and base elevations of the St. Peter and Prairie du Chien-Jordan aquifers were compared to the well records of the municipal wells. Since the differences between the Metro Model and the averaged values from the well logs were minimal (within ± 5.0 meters) the thicknesses and base elevations were maintained at the global values used in the Metro Model. However, to account for the dominant fracture flow of the groundwater in the Prairie du Chien Group, the thickness of Layer 3 was decreased to 36 meters (the thickness of the Prairie du Chien Group only). In addition, the porosity of Layer 3 in the St. Louis Park area was reduced from 0.09 to 0.05. To maintain a 10 meter thickness between Layers 2 and 3, the base elevation of Layer 3 was raised to 144 meters. These changes were made to the inhomogeneity polygon in Layer 3.

Fixed head boundaries were used in the model to represent regional rivers – the Minnesota and Mississippi.

Local high-capacity wells, open to all or part of the St. Peter Sandstone, the Prairie du Chien Group, and/or the Jordan Sandstone were incorporated into the model. Information regarding the local and regional high-capacity wells is provided in Table 3. The discharges used for the wells are the three-year volume averages from the MNDNR SWUDS database, and are summarized in Table 3. The St. Louis Park municipal wells were also added to the model. The discharges used for the municipal wells reflect the highest historical volumes highlighted in Table 2.

The St. Louis Park groundwater flow model for the St. Peter and Prairie du Chien-Jordan aquifers was calibrated using the head data sets developed by the MPCA for Layers 2 and 3 of the Metro Model. The head data was originally obtained from the MGS CWI database and the MNDNR SWUDS database. The process and calibration results for the Metro Model are described in detail in the MPCA reports. The results of the calibration for the St. Louis Park groundwater flow model are discussed in Section 4.3.3.

4.3.2.2 Mount Simon-Hinckley Aquifer

Layer 5 of the Metro Model, representing the Mount Simon-Hinckley Aquifer was removed and modeled as a single aquifer layer. The model features are depicted in Figure 8. The global transmissivity of the layer in the Metro Model is $252 \text{ m}^2/\text{day}$. A polygon was added to the layer to incorporate changes in the hydrogeologic conditions and properties (“inhomogeneities”) in the vicinity of St. Louis Park. The inhomogeneity polygon (identified as “MtSimonTrans”) was placed within Polygon “L4-LKG-N” and completely encompassed the City. Within the inhomogeneity polygon, a permeability of 2.3 m/day (transmissivity of $184 \text{ m}^2/\text{day}$) was used based on the aquifer pumping test performed by the City in October 2003 (please refer to Section 4.1.2.5).

The thicknesses and base elevations of the Mount Simon-Hinckley Aquifer were compared to the well records of the St. Louis Park municipal wells. Based on the well logs the thickness of the layer was increased from 60 meters to 80 meters and the base elevations was lowered from -38 meters above MSL to -49.2 meters above MSL. These changes were made only to

the area of the inhomogeneity polygon. The porosity of the layer was maintained at 0.22, the global value used in the Metro Model.

Fixed head boundaries were used in the model to represent regional rivers – the Minnesota and Mississippi.

Local high-capacity wells, open to all or part of the Mount Simon Sandstone and/or the Hinckley Sandstone were incorporated into the model. Information regarding the local and regional high-capacity wells is provided in Table 3. The discharges used for the wells are the three-year volume averages from the MNDNR SWUDS database, summarized in Table 3. The four St. Louis Park municipal wells open to the Mount Simon-Hinckley Aquifer were also added to the model. The discharges used for the municipal wells reflect the highest historical volumes highlighted in Table 2.

The St. Louis Park groundwater flow model for the Mount Simon-Hinckley Aquifer was calibrated using the head data sets developed by the MPCA for Layer 5 of the Metro Model. The head data was originally obtained from the MGS CWI database and the MNDNR SWUDS database. The process and calibration results for the Metro Model are described in detail in the MPCA reports. The results of the calibration for the St. Louis Park groundwater flow model are discussed in following section.

4.3.3 Results

The electronic files of the MLAEM data sets for the two groundwater flow models are included on a computer disk in Appendix D.

To test the accuracy of the models, the head elevations calculated by the groundwater flow models were compared to the calculated head elevations with the MPCA Metro Model calibration data sets for the three different layers. The St. Peter-Prairie du Chien-Jordan model was solved with no wells discharging to compare heads to the Metro Model results. The Mount Simon-Hinckley model was solved with some wells discharging at the rates specified in the Metro Model. The mean absolute difference in groundwater heads between the model and the calibration dataset in the St. Peter model (Layer 2) was 3.83 meters. The mean absolute head difference for the Prairie du Chien-Jordan Aquifer (Layer 3) was 3.29 meters. The mean absolute head difference for the Mount Simon-Hinckley model (Layer 5) was 3.09 meters. These values are close to the mean absolute differences in the Metro Models, suggesting that the changes made to the St. Louis Park groundwater flow models were not significant. Figures depicting the differences in head between the calibration datasets and the models are provided in Appendix E. Most of the groundwater head data points in or near St. Louis Park are within ± 3.0 meters.

The models indicate that groundwater flow in the St. Peter and Prairie du Chien-Jordan Aquifers in the St. Louis Park area is southeastward as shown in Figures 6 and 7. The groundwater flow direction calculated by the model for the Mount Simon-Hinckley Aquifer is also southeastward as shown in Figure 8. These results correspond and correlate with the MPCA Metro Model, the 1989 Hennepin County Geologic Atlas, and other regional hydrogeologic maps. Specifically, the groundwater flow field and conditions

in the vicinity of St. Louis Park show little change in head or direction when compared to the groundwater elevation contour maps in the MPCA reports.

4.4 Uncertainty

Due to geologic complexity, the St. Louis Park groundwater flow models and resulting WHPAs (capture zones) of the municipal wells are only estimates. Assumptions had to be made in developing and finalizing the model. Therefore, there exists unavoidable uncertainty in the final delineations of the WHPAs.

The Metro Model uses a porosity of 0.09 for the Prairie du Chien-Jordan Aquifer. The porosity of the Jordan Sandstone is likely 0.2 to 0.25 and the competent matrix of the Prairie du Chien Group is likely higher than 0.09. However, it is likely that, due to the fracturing present in the Prairie du Chien Group, preferential groundwater flow in this formation is via the fractures. To account for a dominant fracture-flow system, a porosity of 0.05 in the St. Louis Park area was used in the modeling. In addition, the thickness of the layer was reduced from 70 meters to 36 meters to reflect only the thickness of the Prairie du Chien Group. The use of the lower porosity and the thinner layer results in a larger capture zone (WHPA) for each municipal well. This conservative approach allows for the uncertainty regarding the movement of groundwater via fracture-flow in the Prairie du Chien Group.

To also account for uncertainty, local and regional wells were incorporated into the models. These wells were assumed to be pumping at discharges based on three-year average pumping volumes. This approach was used to simulate the potential changes to the local groundwater flow regime from the pumping of other high-capacity wells.

Two permeabilities were utilized in each layer of the model representing the St. Peter and Prairie du Chien-Jordan Aquifers. The different permeabilities were used to simulate the potential variability in hydrogeological properties of the aquifers and resulted in composite WHPAs.

Generally, the local groundwater directions in the bedrock aquifers in the St. Louis Park area appear to be accurately represented in the models according to available information, namely the Hennepin County Geologic Atlas and the MPCA Metro Model reports. For this Wellhead Protection Plan, it was assumed that the groundwater flow direction would not significantly change enough (seasonally or under varying pumping conditions) to warrant using a variable groundwater flow field. However, new and local hydrologic and hydrogeologic information in the future may indicate different flow conditions, which may be due to transient conditions (i.e. seasonal changes or pumping schedules of high-capacity wells) or aquifer heterogeneities.

Based on the hydrogeologic data and information obtained and used by SEH for this project, it appears that the groundwater flow models and resulting WHPAs are reasonable. As in all complex groundwater systems, local and regional variability will occur and uncertainty will be present. The St. Louis Park groundwater flow models, simulating the St. Peter, Prairie du Chien-Jordan, and Mount Simon-Hinckley Aquifers, meets the intent of the

Minnesota Wellhead Protection, Source Water Protection Rules, and appears adequate for Wellhead Protection purposes.

4.5 Final WHPA and DWSMA Delineations

The 10-year capture zones for the 11 municipal wells were created from the base elevation of each layer in the St. Louis Park groundwater flow models (190 meters above MSL for the St. Peter Aquifer; 120 meters above MSL for the Prairie du Chien-Jordan Aquifer; -49.2 meters above MSL for the Mount Simon-Hinckley Aquifer). Two separate capture zones were delineated for Municipal Wells 3, 4, 6, 8, 10/15, 14, and 16 using two different aquifer permeabilities.

The capture zones from the groundwater flow model were converted to ArcView® shapefiles and finalized using ArcView GIS software. The final one-, five- and ten-year capture zones were delineated as composites of the two capture zones for each well. The WHPAs for the municipal wells are shown in Figure 9. The 10-year WHPAs for Municipal Wells 4 and 6, 8 and 16, and 10/15 and 14 enveloped each other and were therefore, combined into single WHPAs for both wells. The 10-year WHPAs for Municipal Wells 3, 12, and 13 were small and completely embedded within other WHPAs. Therefore, their individual WHPAs are not depicted.

Using the 10-year WHPAs, the corresponding DWSMA was delineated using the most recent parcel boundary map for the City and neighboring communities. Since the 10-year WHPAs for the St. Louis Park municipal wells touched or overlapped, a single DWSMA was delineated. The delineated DWSMA is depicted in Figure 10. The ArcView files of the WHPAs and DWSMA are provided electronically on a computer disk in Appendix F. The WHPAs and DWSMA of the municipal wells extend beyond the St. Louis Park city limits into the cities of Edina, Golden Valley, Hopkins, Minnetonka, Minneapolis, and Plymouth.

5.0 Well and DWSMA Vulnerabilities

This section evaluates the vulnerability of the St. Louis Park municipal wells and DWSMA to potential contaminant sources at the land surface. The vulnerability assessments for the wells and DWSMA were conducted in accordance with rules for preparing and implementing wellhead protection measures (MN Rules, Chapter 4720.5210). Specifically, the wells and DWSMA have been assessed for their likelihood of pollution from land surface sources.

The vulnerability of the municipal wells is based on information regarding the geologic conditions at the wellhead, the wells' construction, and chemical and isotropic composition of the groundwater. The vulnerability of the DWSMA is based on the lateral and vertical extent and composition of geologic materials overlying the source water aquifer, and the chemical and isotropic composition of the groundwater.

5.1 Municipal Well Vulnerability

The MDH has developed a process and database of community and non-community, non-transient, public water supply wells in Minnesota. The database stores information pertinent to well vulnerability, and rates the

vulnerability of individual wells. A score is determined for each well based on factors such as well construction, geology at the well site, and chemical data. Higher scores correlate to greater perceived vulnerability to pollution. A score of 45 or higher is generally used to identify vulnerable wells from non-vulnerable wells. A well is also automatically classified as vulnerable if contamination has been detected (volatile organic compounds detected or nitrate-nitrogen levels greater than 10 mg/L), or if tritium has been detected in concentrations greater than 1.0 tritium unit (TU), indicating the presence of young (post-1953) water. The MDH Well Vulnerability Scoring Sheets for the St. Louis Park municipal wells are included in Appendix G.

As previously discussed, the St. Peter, Prairie du Chien-Jordan, and Mount Simon-Hinckley Aquifers in the St. Louis Park area appear to be hydrologically confined by the Platteville and Glenwood Formations, the basal portion of the St. Peter Sandstone, and by the Eau Claire Formation, respectively. These bedrock units minimize downward, vertical infiltration of precipitation and groundwater. However, some of the St. Louis Park municipal wells, open to the St. Peter and Prairie du Chien-Jordan Aquifers, have been contaminated by land use activities (e.g. the Reilly Tar Superfund Site). This suggests that the confining deposits overlying the upper two, source water, bedrock aquifers are absent in areas, or are fractured, and therefore, ineffective at preventing land surface pollutants to infiltrate and contaminate the source water aquifers. Due to its extensive depth and the presence of the Eau Claire Formation, the Mount Simon-Hinckley aquifer is effectively protected as evidenced by the Carbon-14 isotope analyses.

Currently, the St. Louis Park municipal wells open to the Mount Simon-Hinckley Aquifer (Municipal Wells 11, 12, 13, and 17) are classified as non-vulnerable. In addition, Municipal Well 8 is currently classified as non-vulnerable. The other seven, active municipal wells (Municipal Wells 3, 4, 6, 10, 14, 15, and 16) are listed as vulnerable. Generally, the information provided on the MDH Vulnerability Scoring Sheets appears accurate and the City does not have additional or updated information to challenge the scoring. However, due to the presence of tritium in the other municipal wells open to the Prairie du Chien-Jordan Aquifer, the City has reclassified Municipal Well 8 as vulnerable.

5.2 DWSMA Vulnerability

The DWSMA delineated for the St. Louis Park municipal wells was overlaid on various maps and ArcView® coverages to assess its vulnerability to pollutant sources at the land surface. The hydrogeologic sensitivity of the Prairie du Chien-Jordan Aquifer to contamination, based on the 1989 Hennepin County Geologic Atlas is shown in Figure 11. Based on this figure, the St. Louis Park DWSMA appears to have areas of *Very Low*, *Low*, *Low-Moderate*, *Moderate*, and *High-Moderate* susceptibility related to the Prairie du Chien-Jordan Aquifer.

To obtain more recent information regarding the geologic conditions in the DWSMA, 12 wells were identified within the DWSMA that have been constructed since the 1989 Hennepin County Geologic Atlas. The Unique Well Numbers of these 12 wells are: 255601, 459164, 462932, 462934, 505669, 505670, 508116, 559412, 578922, 579171, 593585, and 626793.

The well construction logs were obtained for these wells through the MGS County Well Index. Three of the wells (Unique Well Nos. 505669, 505670, and 559412) do not have geologic, stratigraphic data provided on their logs. Only two of the wells (Unique Well Nos. 508116 and 578922) penetrate and utilize the Prairie du Chien-Jordan source water aquifer, and only two of the remaining wells (Unique Well Nos. 255601 and 459164) extend to bedrock. The other wells utilize aquifers within the glacial drift deposits above bedrock. Using the information from these recently-installed wells, it was determined that no significant changes to the 1989 Hennepin County Geologic Atlas are warranted for the pollution sensitivity of the Prairie du Chien-Jordan bedrock aquifer within the DWSMA.

Although there is evidence that the St. Peter and Prairie du Chien - Jordan Aquifers are hydrologically confined, the high tritium levels and documented local and regional groundwater contamination indicate that the DWSMA may be more vulnerable to potential contaminant sources at the land surface.

Due to the tritium levels locally detected in the Prairie du Chien-Jordan source water aquifer, the pollution sensitivity and vulnerability of the St. Louis Park DWSMA has been increased one level. In addition, *Low-Moderate* and *Moderate-High* classifications have been revised upward to *Moderate* and *High*, respectively. Figure 12 depicts the finalized DWSMA vulnerability rating. The majority of the DWSMA is classified as highly vulnerable, but areas of moderate and low vulnerability are present in the northern, western and far southern regions of the DWSMA.

6.0 Conclusions

Two MLAEM[®] groundwater flow models were developed for the St. Louis Park area to delineate the WHPAs of the 11 actively-used municipal wells. The models simulated the St. Peter, Prairie du Chien-Jordan, and Mount Simon-Hinckley bedrock aquifers. The 10-year WHPAs were utilized to delineate the DWSMA.

Based on the vulnerability assessments, the eight municipal wells open to the St. Peter and Prairie du Chien-Jordan aquifers have been classified as vulnerable to potential contaminant sources at the land surface. The municipal wells, open only to the Mount Simon-Hinckley bedrock aquifer, are classified as non-vulnerable. The majority of the DWSMA has been classified as highly vulnerable to pollutant sources due to the lack of, or inadequacy/ineffectiveness of, confining deposits above the upper two source water aquifers, as evidenced by high tritium levels in the groundwater. Areas of moderate and low vulnerability are present in the northern, western and far southern regions of the DWSMA.

7.0 Recommendations

Since several of the municipal wells and their corresponding DWSMA have been assessed as being highly vulnerable, Part II of St. Louis Park's Wellhead and Source Water Protection Plan should focus on all potential contaminant sources located within the DWSMA. A comprehensive review of land uses and activities within the DWSMA should be performed.

Additional hydrogeologic work conducted in the next 10 years will provide supplemental data and information that can be used to more accurately refine and revise the groundwater flow model for future updates to the St. Louis Park Wellhead Protection Plan. Over the next decade the City will consider the following:

- Coordinate with MDH staff to have groundwater samples collected from municipal wells open to the three source water aquifers to be again analyzed for tritium and Carbon-14 isotopes. This updated data can be used to confirm and validate the vulnerabilities of the source water aquifers.
- Routinely record the static and pumping groundwater levels in the municipal wells. This data can be used in the future to better define the local groundwater flow fields of the aquifers, and determine whether the supply of groundwater in the aquifers is diminishing over time.
- Work with county and/or state government agencies in future and ongoing efforts to compile regional geologic and hydrogeologic information through investigations and studies.

8.0 Standard of Care

The interpretations presented in this report are based on local data collected during this study and previous studies, such as current and historical pumping tests and regional data collected from governmental agencies. Data collected and analyzed by other parties and used in this report may not be precise or accurate. This report does not account for any variations that may occur between points of exploration; geologic and hydrogeologic conditions likely differ across the study area. Also, it must be noted that seasonal and cyclical fluctuations in the hydrogeologic characteristics/properties of the aquifer will occur.

The scope of this report and the corresponding groundwater flow model is limited to the delineation of capture zones for the City of St. Louis Park municipal wells. Use of the groundwater flow model by others or for other purposes is not advised. Use or modification of the model for purposes other than the delineation of capture zones must be done with caution and a full understanding of the inherent assumptions and limitations of the data.

This report represents our understanding of the significant aspects of the local geologic and hydrogeologic conditions; the conclusions are based on our hydrogeologic and engineering judgment, and represent our professional opinions. These opinions were arrived at in accordance with the currently accepted standard of care for geologic and engineering practices at this time and location. No warranty is implied or intended.

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- Overview of the Twin Cities Metropolitan Groundwater Model Version 1.00*; July 2000; John K. Seaberg; Minnesota Pollution Control Agency.

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Table 5 – Groundwater Flow Model Parameters

Table 1
Municipal Well Specifications and Characteristics

Well No.	Unique Well No.	Year Constructed	Northing	Easting	Aquifer Formation(s)	Total Depth (ft)	Static Level/Range (ft)	Casing Diameter (in)	Casing Depth (ft)	Pump Depth (ft)	Design Capacity (GPM)	Actual Capacity (GPM)	Status	Vulnerability
3	206440	1939	4977534	471026	St. Peter	286	60	24	103	223	1200	900	Standby	Vulnerable
4	200542	1946	4975132	473203	Prairie du Chien-Jordan	474.5	85	24-18	304	250	1270	1250	Primary	Vulnerable
5	203196	1947	4976568	469653	Prairie du Chien-Jordan	465	91	24-20	305	480	NA	NA	Out of Service	Vulnerable
6	206457	1948	4974462	472079	Prairie du Chien-Jordan	482	77	24-20	303	225	NA	NA	Standby	Vulnerable
7	206436	1952	4978378	470699	Prairie du Chien-Jordan	446	58	24-20	247	200	NA	NA	Out of Service	Not Vulnerable
8	203678	1955	4979510	468215	Prairie du Chien-Jordan	507	95	24-16	311	230	1300	1200	Primary	Not Vulnerable
9	206437	1956	4978367	470613	Prairie du Chien-Jordan	473	70	24-16	289	200	NA	NA	Out of Service	Not Vulnerable
10	206442	1955	4977506	470979	Prairie du Chien-Jordan	500	104	24-16	316	260	1350	1250	Primary	Vulnerable
11	206439	1960	4977590	471027	Mt. Simon	1093	221	24-16	880	500	1300	1200	Primary	Not Vulnerable
12	206456	1965	4974421	472056	Mt. Simon	1095	245	30-24-16	900	510	1300	1150	Primary	Not Vulnerable
13	206424	1964	4979130	471881	Mt. Simon	1045	255	30-24-16	891	430	1300	1200	Primary	Not Vulnerable
14	227965	1965	4979130	471881	Prairie du Chien-Jordan	485	80	30-24-16	389	290	1300	1200	Primary	Vulnerable
15	215447	1969	4977590	471027	Jordan	503	115	30-24	389	--	1350	1250	Primary	Vulnerable
16	203187	1973	4978917	468730	Jordan	500	125	30-24	425	245	1300	1150	Primary	Vulnerable
17	147459	1983	4976568	469622	Mt. Simon	1085	315	36-30-24-16	818	480	NA	NA	Standby	Not Vulnerable

Notes: Locations in UTM Zone 15 NAD83 Coordinates (meters)
GPM - gallons per minute
Municipal Wells 5, 7, and 9 to be abandoned and sealed
Municipal Wells 3, 6, and 17 used as emergency backup and not included in Wellhead Protection
NA - Not applicable

Table 2
Groundwater Production and Use

Well No.	Unique Well No.	1998 (MGY)	1999 (MGY)	2000 (MGY)	2001 (MGY)	2002 (MGY)	Average (MGY)	2007 Projected* (MGY)	Highest (gal/day)	Highest** (m ³ /day)
3	206440	1.318	1.544	0.594	16.692	12.682	6.566	6.894	45,732	173.1
4	200542	447.955	527.892	465.300	501.219	342.974	457.068	479.921	1,446,280	5,474.2
5	203196	0.000	0.000	0.000	0.000	0.000	0.000	NA	NA	NA
6	206457	68.108	19.174	11.471	2.311	0.000	20.213	21.223	186,600	706.3
7	206436	0.000	0.000	0.000	0.000	0.000	0.000	NA	NA	NA
8	203678	604.597	613.653	548.033	300.268	496.701	512.650	538.283	1,681,241	6,363.5
9	206437	0.000	0.000	0.000	0.000	0.000	0.000	NA	NA	NA
10***	206442	337.602	369.083	247.224	378.001	334.516	333.285	349.949	1,035,619	3,919.8
11	206439	22.235	9.939	89.508	74.937	43.415	48.007	50.407	245,227	928.2
12	206456	194.784	247.745	449.391	390.928	225.595	301.689	316.773	1,231,208	4,660.1
13	206424	79.809	62.980	74.908	235.871	56.358	101.985	107.084	646,222	2,446.0
14	227965	354.308	433.498	336.399	187.920	410.828	344.591	361.820	1,187,666	4,495.3
15***	215447	0.000	0.000	0.000	0.000	0.000	0.000	***	***	***
16	203187	256.033	194.113	275.859	357.708	297.129	276.168	289.977	980,022	3,709.4
17	147459	0.000	0.000	0.000	0.000	0.000	0.000	NA	NA	NA
Total Volume Pumped (MGY)		2366.749	2479.621	2498.687	2445.855	2220.198	2402.222	2522.3331		

Notes: * Assumes a 1% increase of average per year

** Pumping rate used in the groundwater flow model

*** Municipal Wells 10 and 15 designed and constructed the same, but only one of the wells pumps at a time.

NA - Not Applicable-well out of service or emergency standby

Shaded box indicates highest annual pumping volume

<div>Table 3</div> <div>Local and Regional High Capacity Wells</div>											
Facility	DNR Permit No.	Unique Well No.	Northing	Easting	Aquifer	Use	Permitted Volume (MGY)	2000 Usage (MGY)	2001 Usage (MGY)	2002 Usage (MGY)	Discharge Used in Model(s) (m ³ /day)
AACRON Inc.	786281	149848	4984032	463775	Prairie du Chien-Jordan	Metal Processing	217	171.4	175.6	174.0	1800.90
Abbott Northwestern Hospital	630066	201082	4977987	479284	Jordan	Once-Through Heating or A/C	400	156.0	208.6	205.0	1968.89
		201083	4978023	479316	Jordan	Once-Through Heating or A/C		115.9	127.8	117.1	1247.15
City of Edina	731119	200561	4971862	472788	Prairie du Chien-Jordan	Municipal Supply	3000	184.3	114.9	166.4	1609.40
		200564	4971537	472600	Prairie du Chien-Jordan	Municipal Supply		461.1	459.2	428.3	4661.60
		203613	4974188	468828	Jordan	Municipal Supply		230.2	287.6	385.8	3123.40
		203614	4974191	468819	Mt. Simon-Hinckley	Municipal Supply		273.2	152.0	210.0	2195.65
		206183	4968034	473197	Jordan	Municipal Supply		238.4	529.6	340.5	3831.66
		206184	4968046	473176	Mt. Simon-Hinckley	Municipal Supply		130.5	179.5	396.1	2440.72
		208399	4973279	473163	Prairie du Chien-Jordan	Municipal Supply		295.6	238.9	216.4	2595.58
City of Hopkins	756245	112228	4975792	467675	Prairie du Chien-Jordan	Municipal Supply	1000	268.8	0.5	24.5	1015.56
		204068	4975893	466990	Prairie du Chien-Jordan	Municipal Supply		601.0	1022.8	902.6	8732.81
City of Minnetonka	796207	132263	4971631	465618	Prairie du Chien-Jordan	Municipal Supply	3500	277.5	238.3	292.2	2792.95
		150351	4972953	460477	Prairie du Chien-Jordan	Municipal Supply		210.7	174.8	211.1	2062.22
		150356	4976728	463470	Prairie du Chien-Jordan	Municipal Supply		214.8	146.0	262.9	2155.89
		191939	4979532	464620	Prairie du Chien-Jordan	Municipal Supply		275.8	300.4	251.8	2862.08
		203717	4979624	464593	Prairie du Chien-Jordan	Municipal Supply		216.2	280.0	244.1	2558.94
		204054	4977549	467252	Jordan	Municipal Supply		250.6	225.2	215.2	2388.53
		204140	4976645	463472	Prairie du Chien-Jordan	Municipal Supply		230.4	120.4	102.4	1566.54
		205165	4971681	465662	Prairie du Chien-Jordan	Municipal Supply		410.9	362.9	318.5	3775.67
		208012	4977551	467193	Jordan	Municipal Supply		178.5	201.4	203.2	2015.56
		208014	4972735	463639	Prairie du Chien-Jordan	Municipal Supply		345.1	293.8	187.6	2856.90
		208016	4973015	460493	Prairie du Chien-Jordan	Municipal Supply		182.8	242.4	108.2	1843.76
		439797	4972828	463600	Prairie du Chien-Jordan	Municipal Supply		317.4	238.6	171.4	2514.35
City of Plymouth	786376	160023	4983518	462962	Prairie du Chien-Jordan	Municipal Supply	3600	154.2	258.8	221.7	2193.92
		184882	4983147	463214	Prairie du Chien-Jordan	Municipal Supply		325.5	287.7	286.6	3110.27
		204618	4983858	463227	Prairie du Chien-Jordan	Municipal Supply		304.0	275.1	178.7	2619.43
		204619	4983844	462993	Prairie du Chien-Jordan	Municipal Supply		353.6	274.8	311.8	3249.92
		449184	4983526	463608	Prairie du Chien-Jordan	Municipal Supply		332.4	317.2	269.2	3175.94
		432024	4986689	466823	Jordan	Municipal Supply		384.3	316.1	321.4	3531.98
		432026	4987090	466789	Prairie du Chien-Jordan	Municipal Supply		353.8	347.5	368.4	3697.55
		439796	4986701	466612	Prairie du Chien-Jordan	Municipal Supply		397.5	366.4	340.0	3815.76
		462918	4983141	462850	Jordan	Municipal Supply		314.2	262.2	234.6	2803.32
		481659	4986651	467107	Jordan	Municipal Supply		322.6	342.6	319.4	3403.39
		508300	4983191	463598	Prairie du Chien-Jordan	Municipal Supply		336.8	273.8	251.5	2979.95
City of Richfield	620691	206276	4970415	478967	Prairie du Chien-Jordan	Municipal Supply	1900	156.2	216.1	201.5	1983.41
		206279	4970069	479506	Prairie du Chien-Jordan	Municipal Supply		177.8	157.3	71.8	1406.50
		206280	4970164	479110	Prairie du Chien-Jordan	Municipal Supply		284.1	186.6	343.0	2812.65
		206353	4970720	478075	Jordan	Municipal Supply		326.2	188.9	113.9	2174.21
		206354	4970582	478075	Jordan	Municipal Supply		264.6	241.9	117.0	2155.20
		206361	4970729	478940	Prairie du Chien-Jordan	Municipal Supply		160.4	291.8	328.7	2699.28
City of Robbinsdale	756216	211995	4986319	473284	St. Peter-Prairie du Chien-Jordan-Franconia	Municipal Supply	650	124.9	146.5	141.5	1427.24
		211996	4986295	473295	Prairie du Chien-Jordan	Municipal Supply		131.1	137.6	78.7	1200.83
		211997	4985660	472824	Prairie du Chien-Jordan	Municipal Supply		170.0	162.2	188.6	1800.21
City of Wayzata	650433	206932	4980325	459481	Prairie du Chien-Jordan	Municipal Supply	350	94.7	105.4	106.7	1060.49
Flame Metals Processing	846234	206454	4975759	470671	Prairie du Chien	Metal Processing	2.0	1.0	1.3	0.4	9.33
General Mills Inc.	745231	224098	4980440	468695	Prairie du Chien-Jordan	Once-Through Heating or A/C	650	131.0	163.5	195.0	1692.02
		226208	4980554	468692	Prairie du Chien-Jordan	Once-Through Heating or A/C		67.5	27.0	217.4	1078.12
Honeywell Inc.	856146	203892	4982906	471370	Prairie du Chien-Jordan	Industrial Process Cooling	500	142.0	182.6	222.9	1892.50
MCC Development Co. Inc.	856295	235775			Prairie du Chien-Jordan	Once-Through Heating or A/C	345	161.9	147.3	133.8	1531.28
Minneapolis Golf Club	866083	203183	4979085	468857	Prairie du Chien-Jordan	Golf Course	90	8.9	9.7	7.4	89.87
Target Corporation	806275	201013	4979574	474325	Prairie du Chien-Jordan	Landscaping/Athletic Fields	8.0	37.1	7.7	4.8	171.45
THS Northstar Assoc	640643	201001	4980215	478828	Prairie du Chien-Jordan	Once-Through Heating or A/C	500	184.7	177.3	58.6	1453.85
		201002	4980309	478881	Prairie du Chien-Jordan	Once-Through Heating or A/C		113.3	107.7	129.1	1210.16

Table 4
Regional Aquifer Pumping Test Results - Prairie du Chien-Jordan

Location	Year	Executor	Transmissivity (ft ² /day)	Hydraulic Conductivity (ft/day)
City of Bloomington	1995	Barr Engineering Co.	29,600	118
City of Edina	1995	MN Dept of Health	14,707	73.5
City of Eden Prairie	1995	MN Dept of Health	11,800	59
City of Minnetonka	1994	MN Dept of Health	2,400	12.5
City of Minnetonka	2001 & 2002	SEH Inc.	12,609	64.1
		Mean Values	14,223	65.4
		Median Values	12,609	64

Table 5
Groundwater Flow Model Parameters

Layer	Model Attribute	Aquifer Represented	Base Elevation (m above MSL)	Thickness (m)	Permeability (m/day)	Porosity
2	Global	St. Peter	190	29	3.3	0.30
	St. Louis Park Inhomogeneity		190	29	3.3 & 9.6	0.30
3	Global	Prairie du Chien-Jordan	120	60	12	0.09
	St. Louis Park Inhomogeneity		144	36	9.6 & 94.1	0.05
5	Global	Mt. Simon- Hinckley	-38	60	4.2	0.22
	St. Louis Park Inhomogeneity		-49.2	80	2.3	0.22

Notes: m - meters

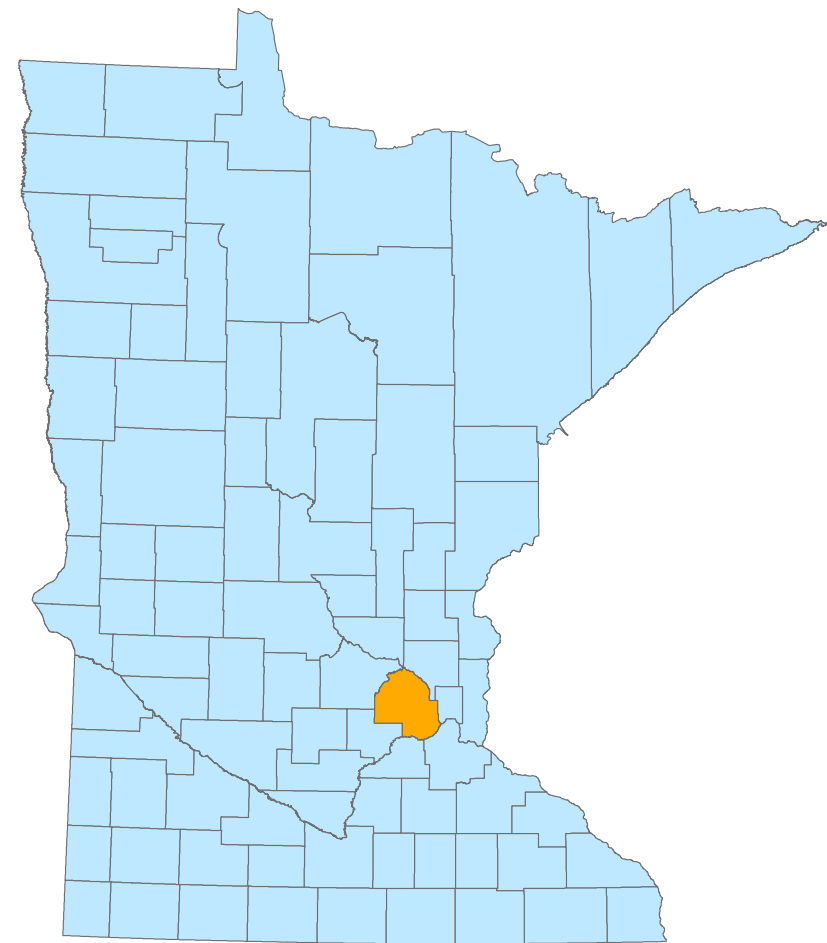
MSL - mean sea level

A leaky layer was placed between Layers 2 and 3 with a resistance of 40,000 days

List of Figures

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- Figure 2 – Generalized Geologic Cross-Section (Southwest to Northeast)
- Figure 3 – Generalized Geologic Cross-Section (Southeast to Northwest)
- Figure 4 – Bedrock Conditions
- Figure 5 – Typical Stratigraphic Column
- Figure 6 – Groundwater Flow Model Features – St. Peter Aquifer
- Figure 7 – Groundwater Flow Model Features – Prairie du Chien-Jordan Aquifer
- Figure 8 – Groundwater Flow Model Features – Mount Simon-Hinckley Aquifer
- Figure 9 – Wellhead Protection Areas
- Figure 10 – Drinking Water Supply Management Area
- Figure 11 – Prairie du Chien-Jordan Aquifer Sensitivity
- Figure 12 – DWSMA Vulnerability

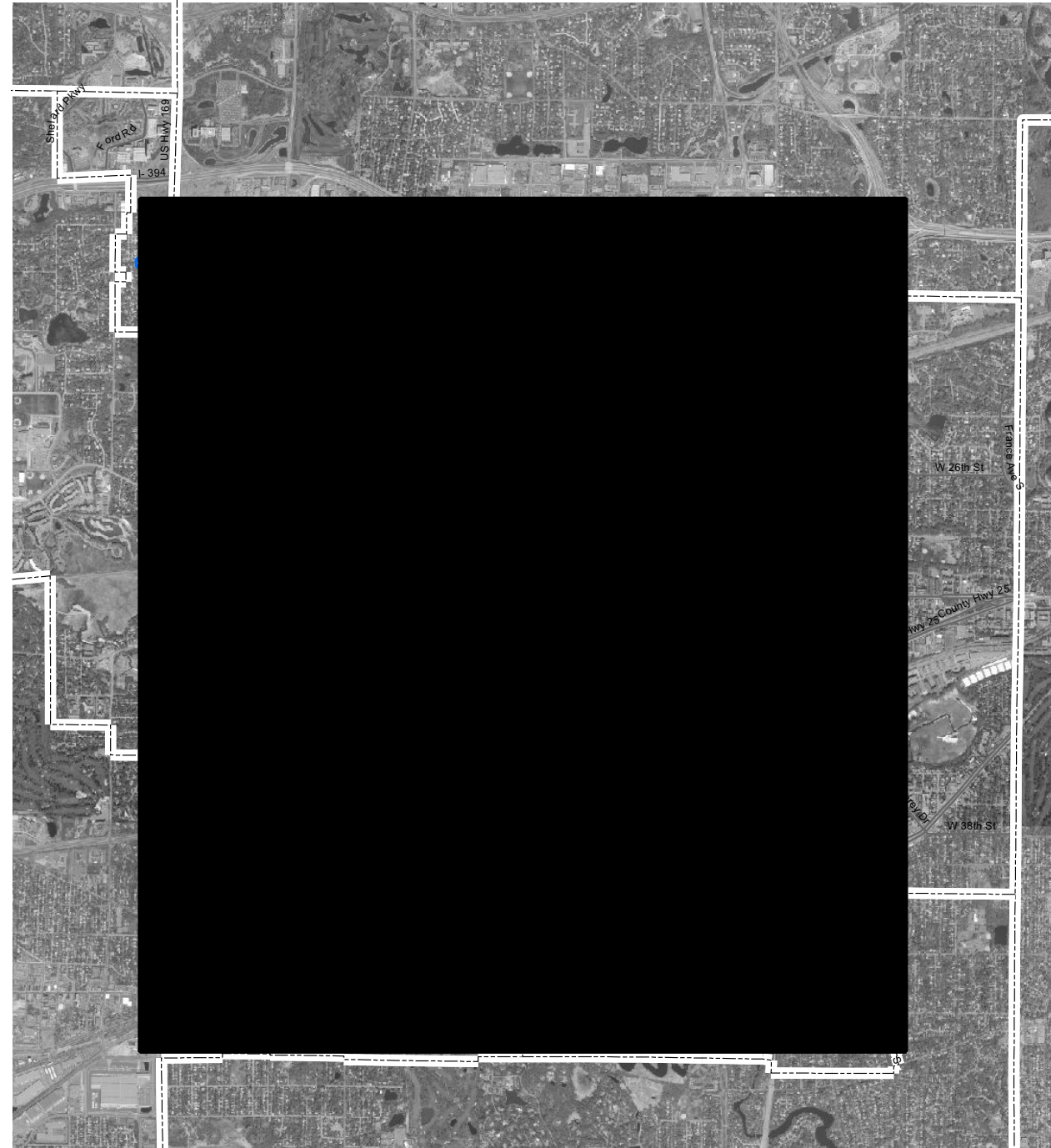
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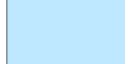
State of Minnesota



Hennepin County



Legend

-  WellLocations
-  City of St. Louis Park
-  Roads
-  Hennepin County
-  State of Minnesota

Source: SEH, MGS, Metro Counties & Metropolitan Council, and Mn/DOT.

Projection:
UTM Zone 15 Meters NAD83
Figure 1 Location Map.mxd



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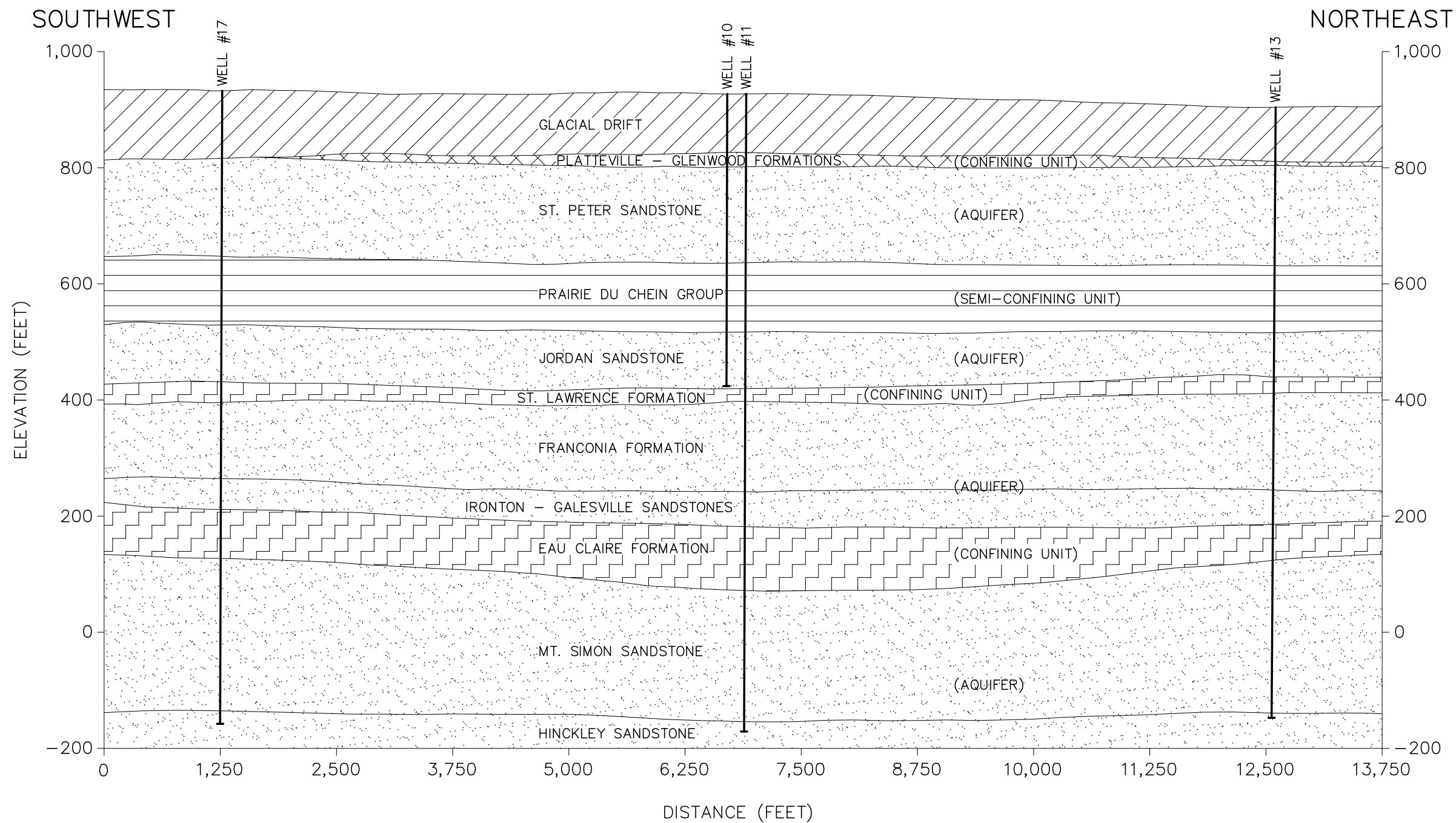
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WELLHEAD PROTECTION PLAN - PART I

St. Louis Park, Minnesota

City
Location Map

Figure
1



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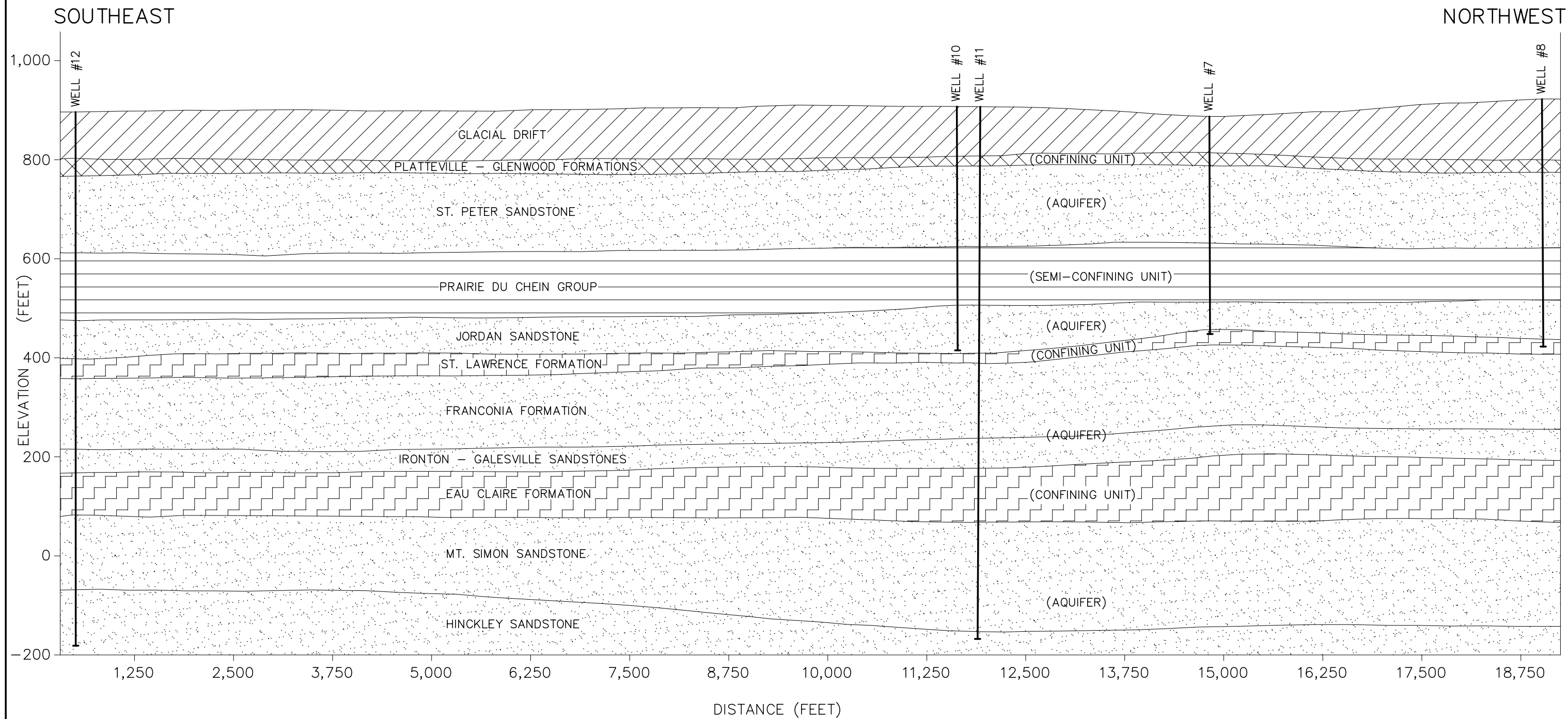
WELLHEAD PROTECTION PLAN
 ST. LOUIS PARK, MINNESOTA

GENERALIZED
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FIGURE
 2

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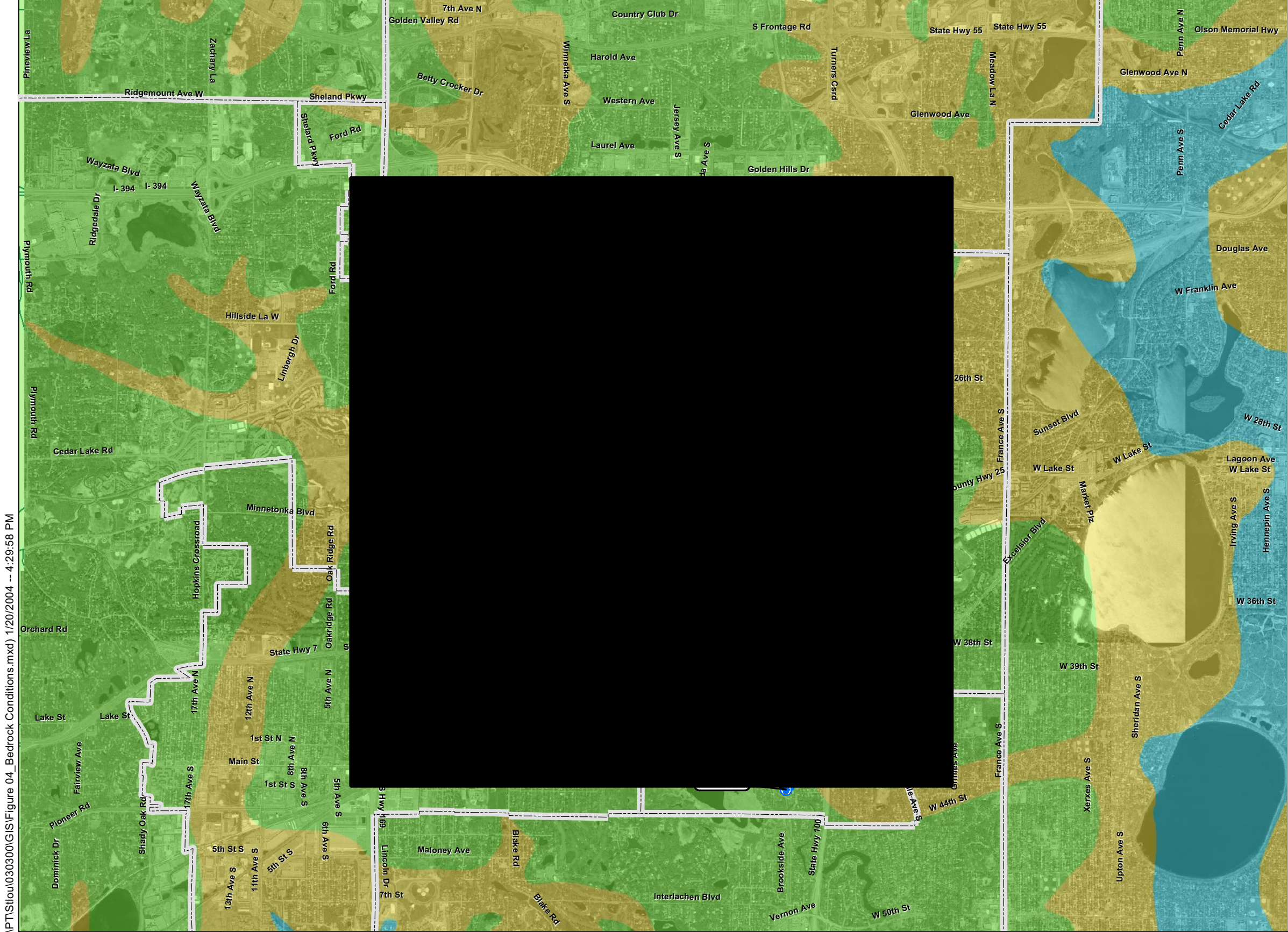


WELLHEAD PROTECTION PLAN
ST. LOUIS PARK, MINNESOTA

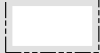



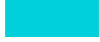
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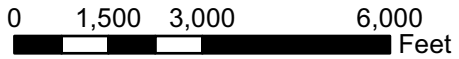
FIGURE
3



Legend

-  Municipal Boundaries
-  Municipal Wells
-  Platteville-Glenwood Formations
-  St. Peter Sandstone
-  Prairie Du Chien Group


Source: SEH, MPCA, MGS, Metro
Counties & Metropolitan Council, and
Mn/DOT.



Projection:
UTM Zone 15 Meters
NAD83



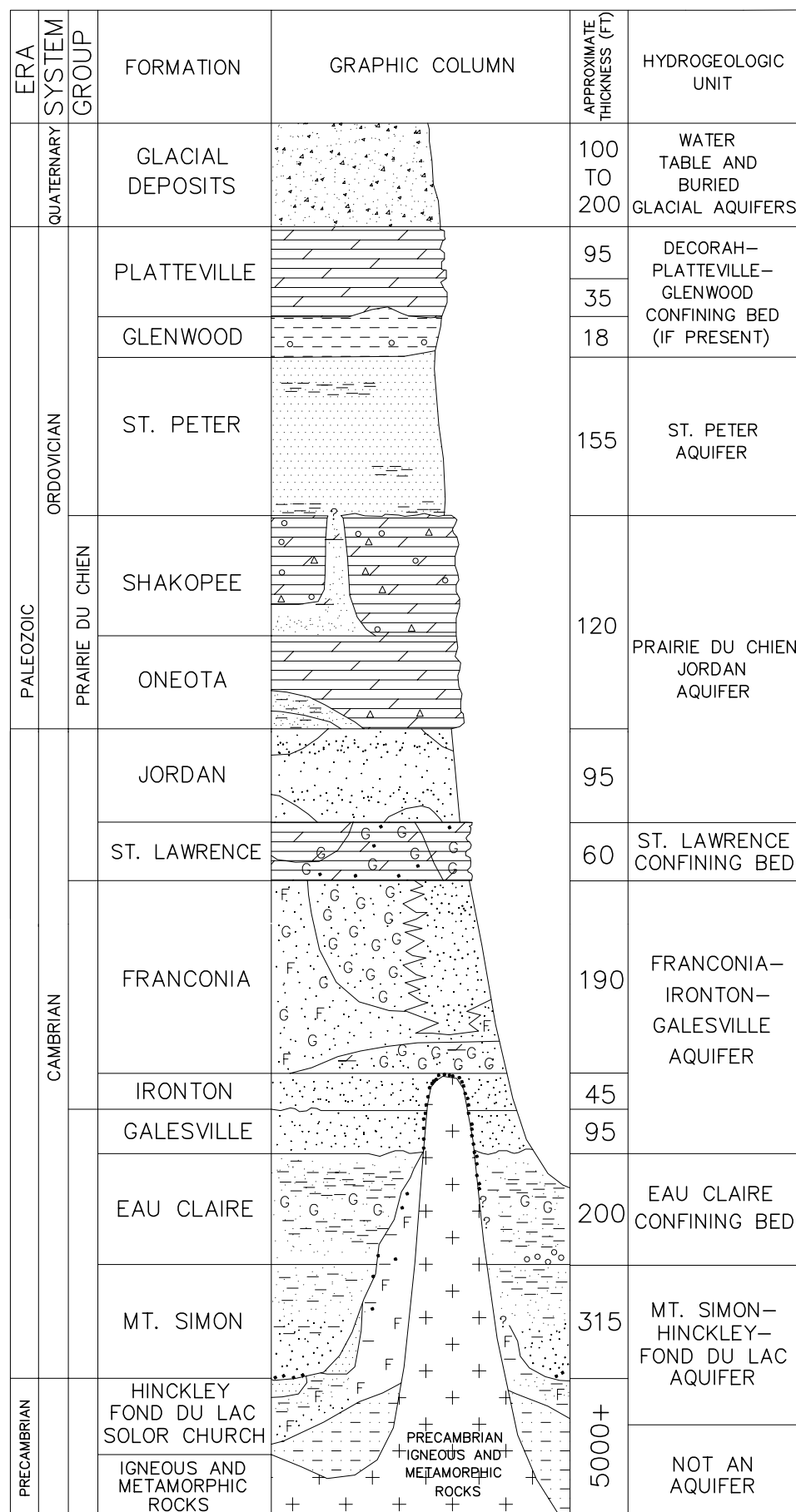
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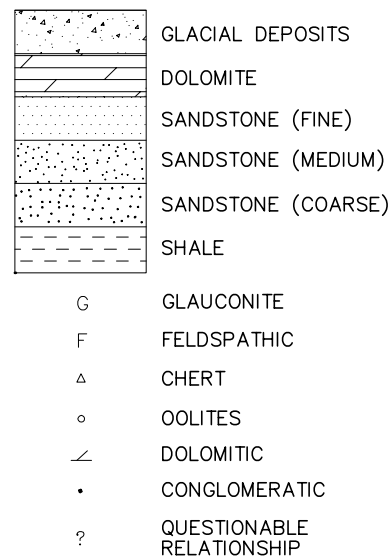
WELLHEAD PROTECTION PLAN - PART I

St. Louis Park, Minnesota

Bedrock Conditions	Figure
	4



SYMBOLS



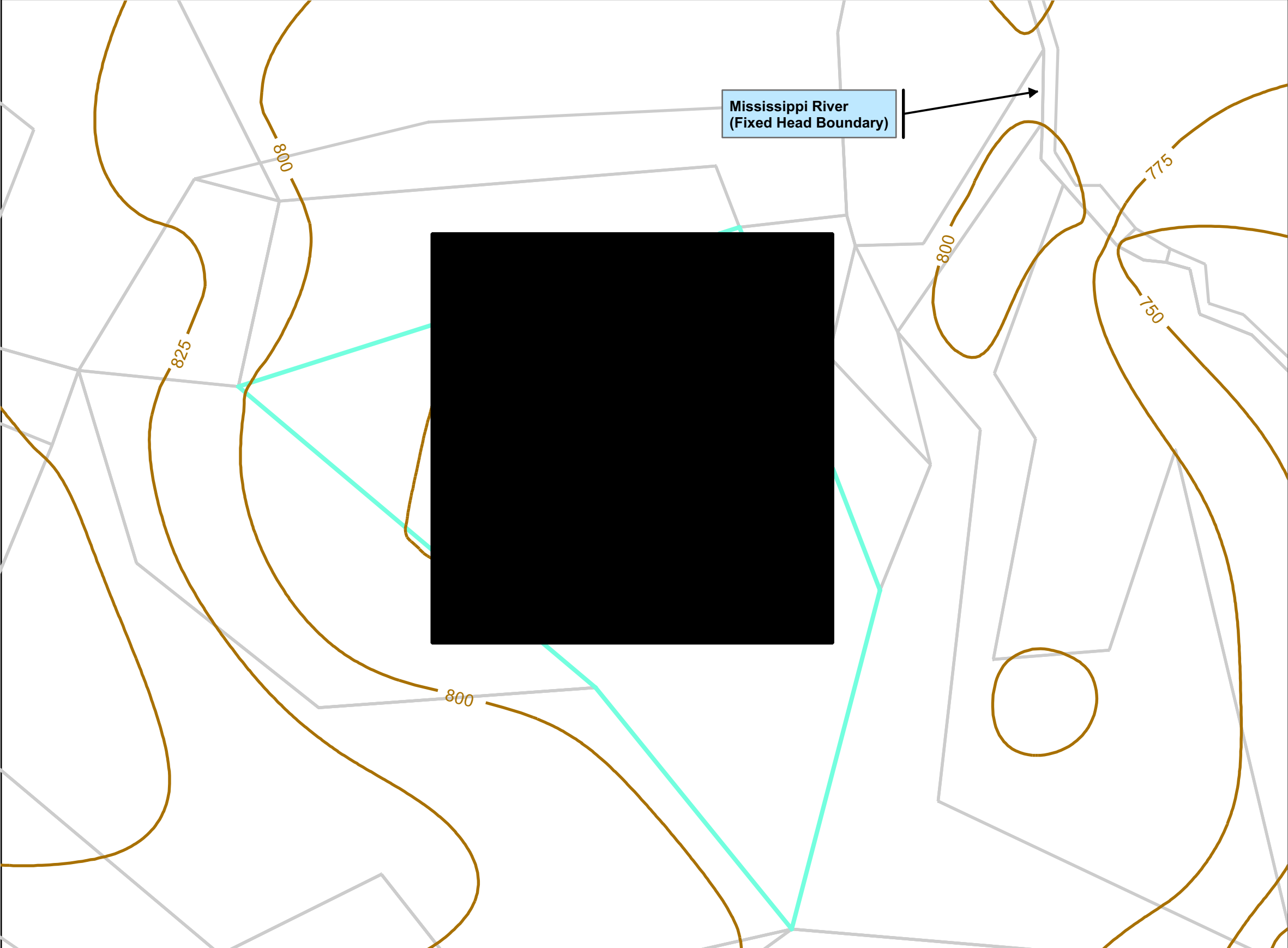
WELLHEAD PROTECTION PLAN
ST. LOUIS PARK, MINNESOTA

TYPICAL
STRATIGRAPHIC COLUMN

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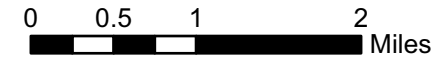
FIGURE
5

Map Document: (X:\PT\Stlou\030300\GIS\Figure 06_StPeterAquifer.mxd) 1/20/2004 -- 10:08:05 AM



- Legend**
- St Louis Park City Boundary
 - Municipal Wells
- St. Peter Model**
- St. Louis Park Inhomogeneity
Aquifer Permeability = 3.3 m/d and 9.6 m/d
 - Model Polygon Mesh
Permeability = 3.3 m/d
Thickness = 29 m
Porosity 0.30
Base Elevation = 190 m
 - Calculated Groundwater Contours (Ft. MSL)

Source: SEH, MGS, Metro Counties & Metropolitan Council.



Projection:
UTM Zone 15 Meters
NAD83



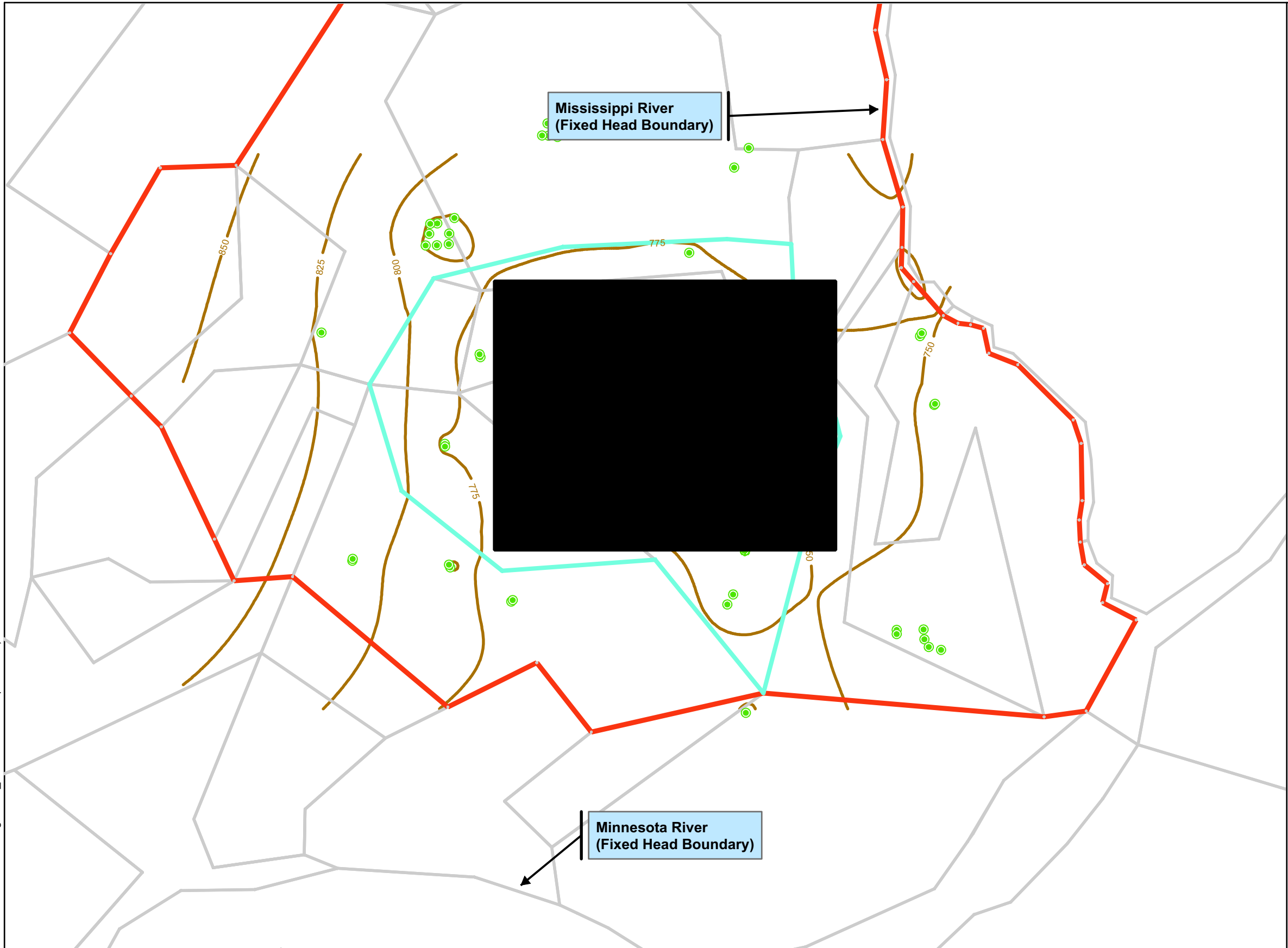
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WELLHEAD PROTECTION PLAN - PART I








St. Louis Park, Minnesota

Groundwater Flow Model Features - St. Peter Aquifer	Figure 6
---	-------------

Map Document: (X:\PT\Stlou\030300\GIS\Figure 07_PrairieDuChienAquifer.mxd) 1/20/2004 -- 11:02:42 AM sh



Legend

-  St Louis Park City Boundary
-  Municipal Wells
-  High Capacity Wells
- Prairie Du Chien-Jordan Aquifer Model**
 -  St. Louis Park Inhomogeneity
Permeability = 9.6 m/d and 94.1 m/d
Thickness = 36 m
Porosity = 0.05
 -  Model Polygon Mesh
Permeability = 12 m/d
Thickness = 60 m
Porosity = 0.09
Base Elevation = 120 m
 -  Leaky Layer
 -  Calculated Groundwater Contours (Ft. MSL)

Source: SEH, MGS, Metro Counties & Metropolitan Council.

0 1 2 4 Miles

Projection:
UTM Zone 15 Meters
NAD83



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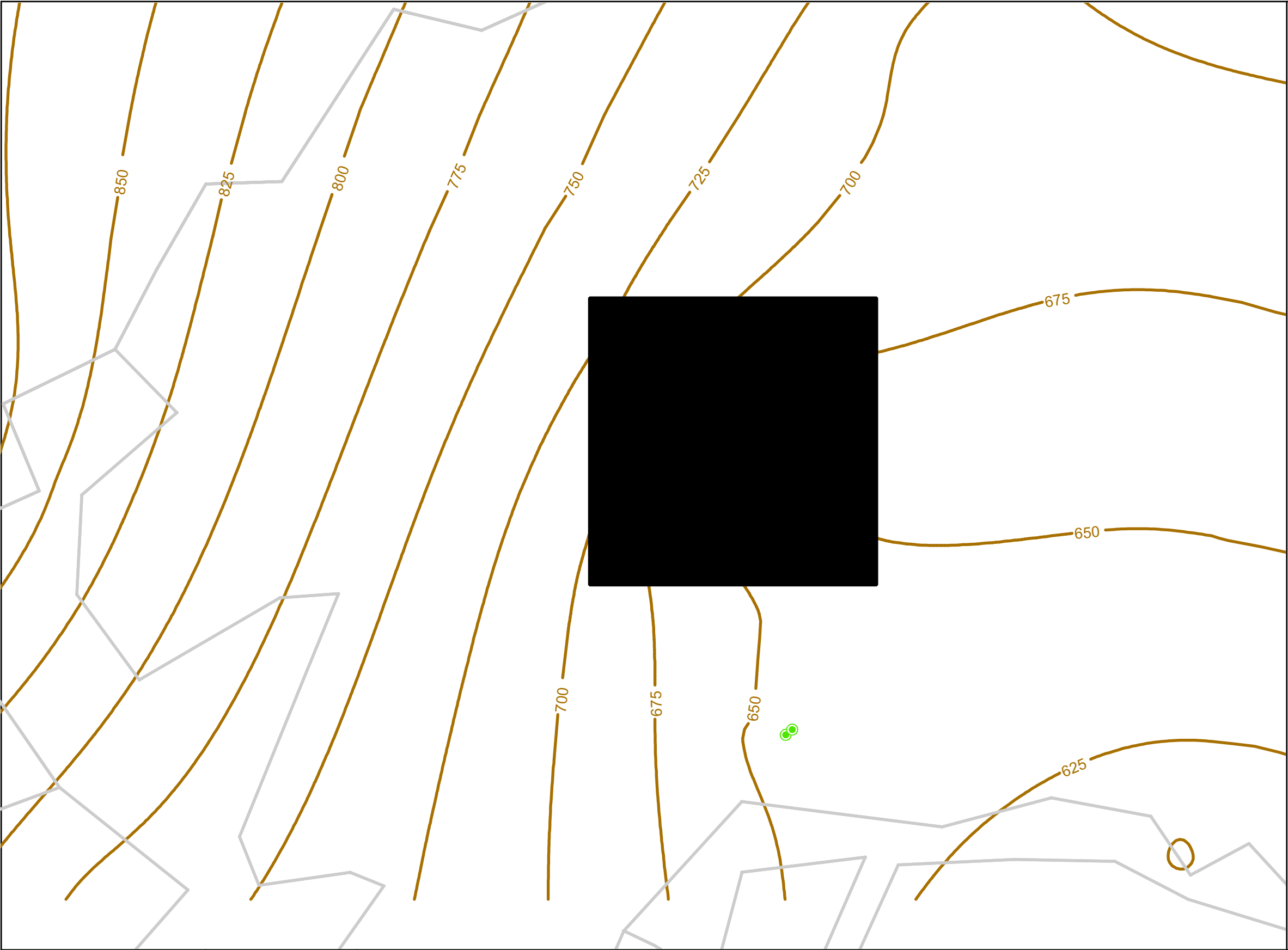
WELLHEAD PROTECTION PLAN - PART I

St. Louis Park, Minnesota


Groundwater Flow
Model Features -
Prairie du Chien-
Jordan Aquifer

Figure
7

Map Document: (X:\PT\Stlou\030300\GIS\Figure 08_MtSimonHinckleyAquifer.mxd) 1/20/2004 -- 10:12:04 AM



Legend


 St Louis Park City Boundary

 Municipal Wells


 High Capacity Wells

Mt. Simon Hinckley Model

St. Louis Park Inhomogeneity

 Permeability = 2.3 m/d
Thickness = 80 m
Base Elevation = -49.2 m

Model Polygon Mesh

 Permeability = 4.2 m/d
Thickness = 60 m
Porosity = 0.22
Base Elevation = -38 m

 Calculated Groundwater
Contours (Ft. MSL)

Source: SEH, MGS, Metro Counties &
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0 1 2 4 Miles

Projection:
UTM Zone 15 Meters
NAD83



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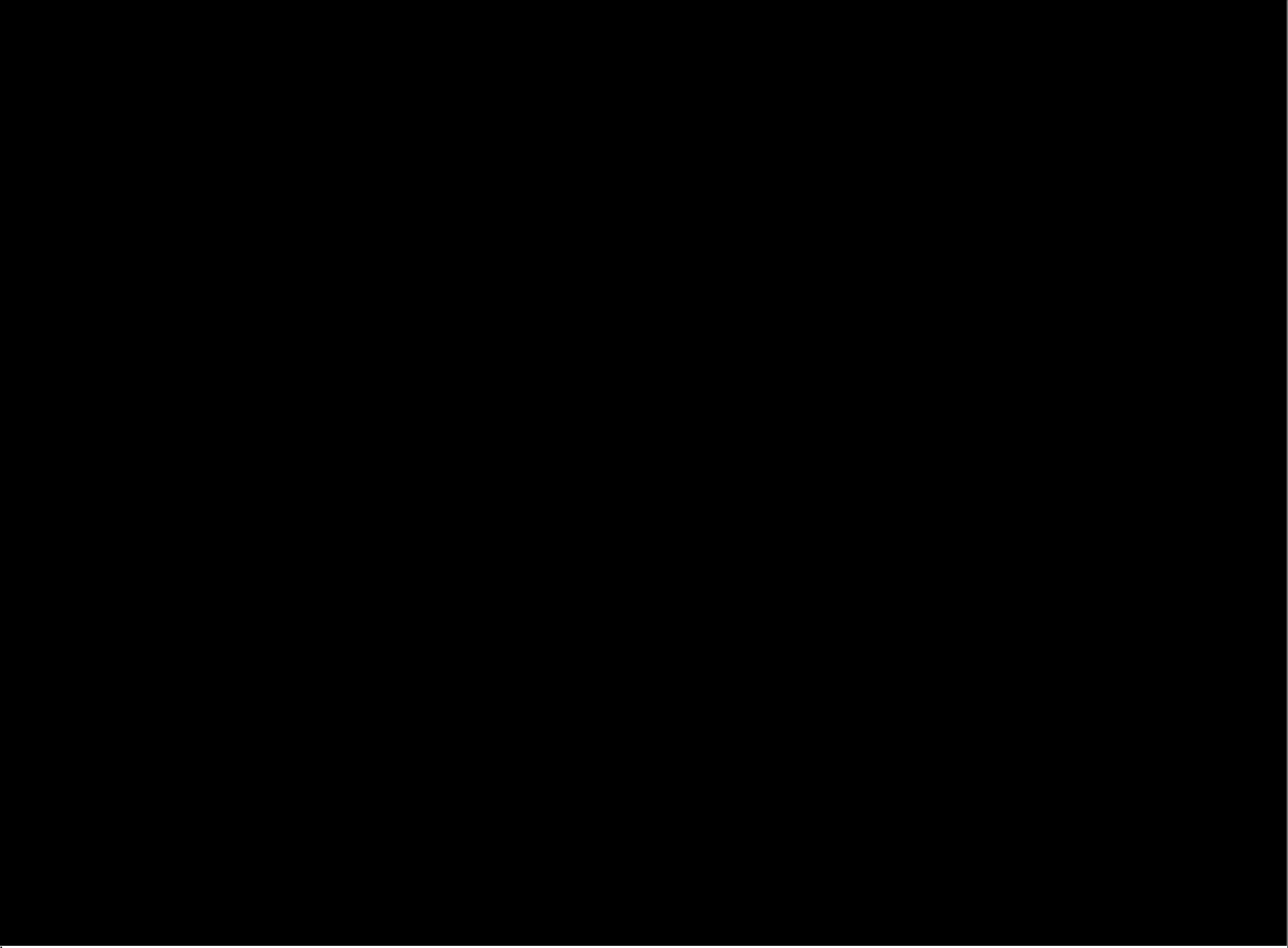
WELLHEAD PROTECTION PLAN - PART I

St. Louis Park, Minnesota











**Groundwater Flow
Model Features -
Mt. Simon-Hinckley
Aquifer**

**Figure
8**

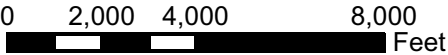
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Legend

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Source: SEH, MGS, USGS and MNDNR,
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and Mn/DOT.



Projection:
UTM Zone 15 Meters
NAD83



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St. Louis Park, Minnesota

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WELLHEAD PROTECTION PLAN - PART I
St. Louis Park, Minnesota

**Drinking Water
Supply Management
Area**

**Figure
10**

Legend


-  10 Year WHPA
-  DWSMA
-  Municipal Boundaries

Source: SEH, MGS, Hennepin County,
Metro Counties and Metropolitan
Council.

0 2,000 4,000 8,000 Feet

Projection:
UTM Zone 15 Meters
NAD83



 High - Moderate





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WELLHEAD PROTECTION PLAN - PART I

St. Louis Park, Minnesota

Legend

Municipal Boundary

Municipal Wells

Vulnerability

High

Moderate

Low

Source: SEH, MPCA, MGS, Metro
Counties & Metropolitan Council, and
Mn/DOT.

02,0004,0008,000

 Feet

Projection:
UTM Zone 15 Meters
NAD83

NORTH

DWSMA
Vulnerability

Figure
12

Appendix A

2002 Drinking Water Consumer Confidence Report

Water Quality Report

Federal law requires all U.S. water utilities to publish an annual report on its drinking water quality. The City of St. Louis Park's Water Utility Division welcomes this opportunity to tell you about the water it delivers to you each day.

2002 Monitoring Results – St. Louis Park Water Meets Or Exceeds All Federal Drinking Water Standards

1 municipal drinking water systems in the United States are tested for regulated and unregulated substances. In order to ensure safe drinking water, the Environmental Protection Agency (EPA) requires public water suppliers to limit—but not eliminate—certain substances from their water.

According to the EPA, tap and bottled water may reasonably be expected to contain small amounts of some substances because their presence does not necessarily indicate a health risk. Removing all substances from drinking water would not provide additional protection to public health. In fact,

removing all substances from drinking water would result in an inferior product. Many naturally occurring minerals are essential nutrients that actually improve the taste of drinking water.

St. Louis Park's municipal water supply is frequently tested to ensure drinking water quality. Test results for 2002 indicate that St. Louis Park's water meets or exceeds all federal drinking water standards. Some substances were found in trace amounts; however, all of these substances are below the legal limits set by the EPA or the State of Minnesota. These substances are shown on the charts in this report.

Source of St. Louis Park's Water

St. Louis Park's drinking water comes from groundwater sources. Eleven wells ranging from 286 to 1095 feet deep draw water from the Prairie Du Chien-Jordan, Mt. Simon, Hinckley and St. Peter aquifers.

Water is stored and delivered to you via a system that includes 140 miles of watermain, six treatment plants, three water towers and four reservoirs. Each year, the St. Louis Park water utility pumps, treats and delivers more than two billion gallons of water to St. Louis Park homes and businesses.

How Your Water Is Treated

Before delivering water to you, St. Louis Park's groundwater is treated by –

- **Aerating and filtering it to remove iron and manganese.** These two minerals can give water a rust-colored appearance; however, they pose no health hazard. In fact, these minerals are often found in vitamin supplements.
- **Disinfecting it to eliminate microorganisms such as viruses and bacteria.**
- **Adding fluoride.** The Minnesota Department of Health requires communities to add fluoride because fluoridated water has been proven to reduce the likelihood of tooth decay, especially in children.

In addition to the treatment listed above, three wells also utilize a granular activated carbon filtration system to remove organic contaminants.

Questions?

Call Utilities Superintendent Scott Anderson at 952/924-2557 if you have questions about the City of St. Louis Park's drinking water.



Regulated Substances Found In St. Louis Park Water

These tables show the substances that were detected in trace amounts last year. (Some substances are sampled less frequently than once a year. Therefore, not all contaminants were sampled for in 2002. If any of these substances were detected during the last sampling, they are included in the table along with the detection date.)

SUBSTANCE (units)	GOAL (MCLG)	HIGHEST ALLOWED (MCL)	RANGE FOUND*	AVERAGE OR RESULT*	TYPICAL SOURCE OF SUBSTANCE
Alpha Emitters (pCi/l) (04/06/1999)	0	15.4	N/A	5.9	Erosion of natural deposits
Arsenic (ppb)	0	50.0	Nd - 2.4	2.4	Erosion of natural deposits or runoff from orchards, glass or electronics production
Barium (ppm)	2.0	2.0	0.14 - 0.18	0.18	Erosion of natural deposits or discharge from metal refineries or drilling waste
Combined radium (pCi/l) (04/06/1999)	0	5.4	N/A	2.88	Erosion of natural deposits
Fluoride (ppm)	4.0	4.0	0.93 - 1.2	1.08	Minnesota requires adding fluoride to promote strong teeth. Other sources are erosion of natural deposits or discharge from fertilizer or aluminum factories.
Nitrate (as nitrogen) (ppm)	10.0	10.0	Nd - 0.06	0.06	Runoff from fertilizer use, leaching from septic tanks/sewage, or erosion of natural deposits
TTHM (total trichloroethylene) (ppb)	N/A	100.0	N/A	0.6	By-product of drinking water disinfection
Trichloroethylene (ppb)	0	5.0	Nd - 0.4	0.4	Discharge from metal degreasing sites or other factories
cis-1,2-Dichloroethylene (ppb)	70.0	70.0	Nd - 5.3	5.3	Discharge from industrial chemical factories
Trans-1,2-Dichloroethylene	100.00	100.0	Nd - 1.3	1.3	Discharge from industrial chemical factories

Unregulated Substances Found in St. Louis Park Water

Some substances do not have established Maximum Contaminant Levels. These "unregulated contaminants" are assessed using State standards known as health risk limits to determine if they pose a threat to human health. If unacceptable levels of an unregulated contaminant are found, the response is the same as if an MCL has been exceeded: the water system must inform its customers and take corrective action. Here are the unregulated contaminants that were detected.

SUBSTANCE (UNITS)	RANGE FOUND	HIGHEST LEVEL DETECTED	TYPICAL SOURCE OF SUBSTANCE
Sodium (ppm)	5.8 - 28.0	28.0	Erosion of natural deposits.
Sulfate (ppm)	11.0 - 36.0	36.0	Erosion of natural deposits.

**This is the value used to determine compliance with federal standards. Sometimes, it is the highest value detected and sometimes it is an average of all the detected values. If it is an average, it may contain sampling results from the previous year.*

Radon in St. Louis Park Water

Radon is a radioactive gas which is naturally occurring in some groundwater. Radon poses a lung cancer risk when gas is released from water into air during showering, bathing or washing dishes or clothes. Radon can pose a stomach cancer risk when it is ingested. Because radon in indoor air poses a much greater health risk than radon in drinking water, an Alternative Maximum Contaminant Level (AMCL) of 4,000 picoCuries per liter applies in states that have adopted an Indoor Air Program which compels citizens, schools and communities to reduce the radon threat from indoor air. Minnesota plans to adopt an Indoor Air Program once the Radon Rule is finalized. Currently, Minnesota uses a Maximum Contaminant Level (MCL) of 300pCi/l.

SUBSTANCE (UNITS)	RANGE FOUND * IN 2002	AVERAGE OR RESULT*	TYPICAL SOURCE OF SUBSTANCE
Radon (pCi/l)	N/A - tested 11/27/2001	139.0	Erosion of natural deposits

Lead And Copper In Household Plumbing

Approximately 60 homes in St. Louis Park have been identified as being at high risk for elevated lead levels due to the presence lead service lines or lead solder. Lead services lines have been replaced with copper lines. Each year, a number of these homes are tested for lead in drinking water. During the most recent sampling, none of these homes exceeded the federal lead levels.

St. Louis Park's tap water is in compliance with federal drinking water standards for lead. The lead does not come from the municipal water supply-it leaches into water from the home's lead pipes, lead service lines, brass plumbing fixtures, or copper pipes with lead solder.

Brass fixtures remain on the market today so it's important to know that a recently purchased brass fixture that dispenses drinking water could leach lead into your otherwise safe drinking water. The simplest way to reduce possible lead exposure is to run your tap for 30 seconds to two minutes before using the water for cooking or drinking. By running your tap, you drain the water that has sat in your home's pipes and replace it with safe water from the municipal system.

SUBSTANCE (UNITS)	MCLG	ACTION LEVEL	90% LEVELS	# OF SITES OVER ACTION LEVEL	TYPICAL SOURCE OF SUBSTANCE
Lead (ppb) (12/27/2000)	N/A	15	4.5	0 out of 30	Corrosion of household plumbing or erosion of natural deposits
Copper (ppm) (12/27/2000)	N/A	1.3	0.333	0 out of 30	Corrosion of household plumbing or erosion of natural deposits

KEY TO ABBREVIATIONS AND TERMS -

MCLG-Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

MCL-Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Action Level: The concentration of a contaminant, which, if exceeded, triggers treatment, or other requirements, which a water system must follow.

90th Percentile Level - This is the value obtained after disregarding 10 percent of the samples taken that had the highest levels. (For example, in a situation in which 10 samples were taken, the 90th percentile level is determined by disregarding the highest result, which represents 10 percent of the samples.) Note: In situations in which only 5 samples are taken, the average of the two with the highest levels is taken to determine the 90th percentile level.

pCi/l—PicoCuries per liter (a measure of radioactivity)

ppb—Parts per billion, which can also be expressed as micrograms per liter (ug/l)

ppm—Parts per million, which can also be expressed as milligrams per liter (mg/l)

nd—No Detection

N/A—Not Applicable (does not apply)

About Bottled Water

Under federal law, water bottlers are subject to less rigorous testing, treatment and public notification requirements than community water suppliers. In addition, bottled water does not contain fluoride which has been shown to help prevent tooth decay.

Bottled water is also more expensive than tap water. If you drink three 20-oz. bottles of water each day, it will cost you more than \$1,000 a year. The same amount of St. Louis Park tap water will cost you 17 cents for the year.

About Home Treatment Systems

Home water filtration systems have not been proven to improve the safety of municipally treated drinking water. If you opt to use a home water filtration system, be sure to maintain your filter. If filters are not frequently changed, they can become a breeding ground for bacteria. Because St. Louis Park's water contains higher levels of dissolved solids such as iron and calcium than some areas of the country, you may need to change your filter more often than the manufacturer recommends.

Some filtration systems also remove fluoride. If your children are drinking non-fluoridated water, you may wish to consult your dentist about cavity prevention.

A Message From The EPA About Drinking Water In The United States

Compliance With National Primary Drinking Water Regulations

The sources of drinking water (both tap and bottled water) in the United States include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from human activity.

Contaminants that may be present in source water include:

Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

Radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (EPA) prescribes regulations, which limit the amount of certain contaminants in water provided by public water systems.

Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at (800) 426-4791.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by cryptosporidium are available from the Safe Drinking Water Hotline at 1-800-426-4791.



Appendix B

Well Records of Municipal Wells

Unique No. 00200542	MINNESOTA DEPARTMENT OF HEALTH WELL AND BORING RECORD <i>Minnesota Statutes Chapter 1031</i>	Update Date 2002/02/11 Entry Date 1991/08/24																																																																
County Name Hennepin																																																																		
Township Name Township Range Dir Section Subsection 28 24 W 7 BDADAC	Well Depth 490 ft.	Depth Completed 490 ft. Date Well Completed 1946/00/00																																																																
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Contact's Name ST. LOUIS PARK 4 41 LM ST LOUIS PARK MN	Drilling Fluid	Well Hydrofractured? <input type="checkbox"/> Yes <input type="checkbox"/> No From ft. to ft.																																																																
Contact's Name 41ST ST. AND NATCHEZ AV ST LOUIS PARK MN	Use Community Supply (municipal)																																																																	
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Report Copy

Unique No. 00206436		MINNESOTA DEPARTMENT OF HEALTH WELL AND BORING RECORD <i>Minnesota Statutes Chapter 1031</i>			Update Date 2002/02/11 Entry Date 1991/08/24																																																								
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Township Name	Township	Range	Dir	Section	Subsection																																																								
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REMARKS, ELEVATION, SOURCE OF DATA, etc.
 CASING: 024 TO 0080;020 TO 0274.
 COPIED FROM D.N.R.

 USGS Quad Minneapolis South Elevation 905
 Aquifer: MTPL Alt Id: 73-1007

Report Copy

Unique No. 00206442		MINNESOTA DEPARTMENT OF HEALTH WELL AND BORING RECORD		Update Date 2002/02/11	
County Name Hennepin		<i>Minnesota Statutes Chapter 1031</i>		Entry Date 1991/08/24	
Township Name	Township	Range	Dir	Section	Subsection
	117	21	W	8	DCDCBB
Well Depth			Depth Completed		Date Well Completed
500 ft.			500 ft.		1955/09/15
Well Name ST. LOUIS PARK 10			Drilling Method		
Contact's Name ST. LOUIS PARK 10 LM ST. LOUIS PARK MN			Drilling Fluid		Well Hydrofractured? <input type="checkbox"/> Yes <input type="checkbox"/> No From ft. to ft.
			Use Community Supply (municipal)		
			Casing	Drive Shoe? <input type="checkbox"/> Yes <input type="checkbox"/> N	Hole Diameter
			Casing Diameter		Weight(lbs/ft)
			24 in. to 106 ft		
			16 in. to 316 ft		
GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	
SAND + GRAVEL			0	83	
CLAY			83	103	
LIMEROCK			103	123	
ST. PETER SANDROCK			123	288	
SHAKOPEE			288	407	
JORDAN SANDROCK			407	500	
			Screen	Open Hole From ft. to ft. Make Type	
			Static Water Level 104 ft. from Land surface Date 1955/09/15		
			PUMPING LEVEL (below land surface) 199 ft. after hrs. pumping 2005 g.p.m.		
			Well Head Completion Pitless adapter mfr Model Casing Protection <input type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade(Environmental Wells and Borings ONLY)		
			Grouting Information Well grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
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			Was a variance granted from the MDH for this Well? <input type="checkbox"/> Yes <input type="checkbox"/> No		
			Well CONTRACTOR CERTIFICATION Lic. Or Reg. No. <u>62012</u> License Business Name Name of Driller KEYS WELL		
REMARKS, ELEVATION, SOURCE OF DATA, etc. CASING: 024 TO 0106;016 TO 0316. JERSEY AV. N. & 29TH ST. JERSEY AV. N. & MINNETONKA BLVD USGS Quad Minneapolis South Elevation 925 Aquifer: MTPL Alt Id: 73-1007					

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Unique No. 00206456		MINNESOTA DEPARTMENT OF HEALTH			Update Date 2002/02/11	
County Name Hennepin		WELL AND BORING RECORD			Entry Date 1991/08/24	
					Minnesota Statutes Chapter 1031	
Township Name Township Range Dir Section Subsection			Well Depth		Depth Completed Date Well Completed	
117 21 W 21 CDBDCD			1095 ft.		1095 ft. 1965/08/00	
Well Name ST. LOUIS PARK 12			Drilling Method			
Contact's Name ST. LOUIS PARK 12 42ND& ZARTHAN AV. LM ST. LOUIS PARK MN			Drilling Fluid		Well Hydrofractured? <input type="checkbox"/> Yes <input type="checkbox"/> No	
					From ft. to ft.	
			Use Community Supply (municipal)			
			Casing Drive Shoe? <input type="checkbox"/> Yes <input type="checkbox"/> N		Hole Diameter	
GEOLOGICAL MATERIAL COLOR HARDNESS FROM TO			Casing Diameter Weight(lbs/ft)			
DRIFT 0 96			30 in. to 99 ft			
PLATTEVILLE 96 127			24 in. to 270 ft			
SHALE 127 132			16 in. to 900 ft			
ST. PETER 132 292						
SHAKOPEE 292 427			Screen Open Hole From ft. to ft.			
JORDAN 427 505			Make Type			
ST. LAWRENCE 505 550			Static Water Level 245 ft. from Land surface Date 1965/08/00			
FRANCONIA 550 695			PUMPING LEVEL (below land surface)			
IRONTON 695 725			353 ft. after hrs. pumping 1300 g.p.m.			
GALESVILLE 725 745			Well Head Completion			
EAU CLAIRE 745 832			Pitless adapter mfr Model			
MT. SIMON 832 983			Casing Protection <input type="checkbox"/> 12 in. above grade			
HINCKLEY 983 1095			<input type="checkbox"/> At-grade(Environmental Wells and Borings ONLY)			
			Grouting Information Well grouted? <input type="checkbox"/> Yes <input type="checkbox"/> No			
			Nearest Known Source of Contamination			
			ft. direction type			
			Well disinfected upon completion? <input type="checkbox"/> Yes <input type="checkbox"/> No			
REMARKS, ELEVATION, SOURCE OF DATA, etc.			Pump <input type="checkbox"/> Not Installed Date Installed			
			Mfr name			
			Model HP 0 Volts			
			Drop Pipe Length ft. Capacity g.p.m.			
CASING: 030 TO 0099;024 TO 0270;016 TO 0900.			Type			
M.G.S. NO.279			Any not in use and not sealed well(s) on property? <input type="checkbox"/> Yes <input type="checkbox"/> No			
OLD P.A. 63-0083 127104A6508001172121CDBDC			Was a variance granted from the MDH for this Well? <input type="checkbox"/> Yes <input type="checkbox"/> No			
USGS Quad Minneapolis South Elevation 915			Well CONTRACTOR CERTIFICATION Lic. Or Reg. No. 62012			
Aquifer: CMTS Alt Id: 73-1007			License Business Name			
			Name of Driller KEYS WELL			

Report Copy

Unique No. 00147459		MINNESOTA DEPARTMENT OF HEALTH WELL AND BORING RECORD				Update Date 2002/02/11			
County Name Hennepin		Minnesota Statutes Chapter 1031				Entry Date 1991/08/24			
Township Name Township Range Dir Section Subsection 117 21 W 18 DABBAC				Well Depth 1085 ft.		Depth Completed 1085 ft.		Date Well Completed 1983/05/20	
Well Name ST. LOUIS PARK 17				Drilling Method Cable Tool					
Contact's Name ST. LOUIS PARK 17 34THST AND WYOMING LM ST. LOUIS PARK MN				Drilling Fluid		Well Hydrofractured? <input type="checkbox"/> Yes <input type="checkbox"/> No From ft. to ft.			
				Use Community Supply (municipal)					
				Casing		Drive Shoe? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> N		Hole Diameter	
								in. to 1085 ft.	
GEOLOGICAL MATERIAL				COLOR		HARDNESS		FROM TO	
DRIFT								0 105	
DRIFT WITH LIMEROCK								105 115	
SHALE				BLUE				115 124	
ST. PETER SANDSTONE								124 227	
SHALE				RED				227 275	
SHAKOPEE LIMESTONE								275 282	
SHAKOPEE LIMESTONE								282 400	
SHAKOPEE LIMESTONE								400 405	
JORDAN SANDSTONE								405 465	
SHALE				RD/GR				465 500	
SHALE				RD/GR				500 533	
SHALE				RD/GR				533 668	
SHALE				RD/GR				668 691	
SANDSTONE + SHALE LAY								691 718	
SANDSTONE + SHALE LAY								718 802	
SANDSTONE + SHALE LAY								802 805	
SANDSTONE								805 1065	
SANDSTONE								1065 1082	
RED CLASTICS								1082 1085	
REMARKS, ELEVATION, SOURCE OF DATA, etc. M.G.S. NO. 1979 M.G.S. NO.1979. GAMMA LOGGED 6-24-88. USGS Quad Hopkins Elevation 930 Aquifer: CMTS Alt Id: 73-100				Static Water Level 315 ft. from Land surface		Date 1983/04/27			
				PUMPING LEVEL (below land surface) 439 ft. after 120 hrs. pumping 1200 g.p.m.					
				Well Head Completion Pitless adapter mfr Model Casing Protection <input type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade(Environmental Wells and Borings ONLY)					
				Grouting Information		Well grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Material		From To (ft.)		Amount(yds/bags)					
G		0 818		1610 S					
Nearest Known Source of Contamination ft. direction type Well disinfected upon completion? <input type="checkbox"/> Yes <input type="checkbox"/> No									
Pump <input type="checkbox"/> Not Installed Date Installed Mfr name Model HP 0 Volts Drop Pipe Length ft. Capacity g.p.m. Type									
Any not in use and not sealed well(s) on property? <input type="checkbox"/> Yes <input type="checkbox"/> No									
Was a variance granted from the MDH for this Well? <input type="checkbox"/> Yes <input type="checkbox"/> No									
Well CONTRACTOR CERTIFICATION Lic. Or Reg. No. 27010 License Business Name Name of Driller HOLLEN, G									

Report Copy

Appendix C

2003 Pumping Test Report



Division of Environmental Health
Drinking Water Protection Section
Source Water Protection Unit
P.O. Box 64975
St. Paul, Minnesota 55164-0975

Aquifer Test Plan

Public Water Supply ID: 1270050

PWS Name: City of St. Louis Park

Contact

Aquifer Test Contact: Paul Kubesh

Contractor Name & Address: SEH Inc.

3535 Vadnais Ctr. Dr.

City, State, Zip: St. Paul MN 55110

Phone: 651.490.2165 Fax: 651.490.2150

Proposed Aquifer Test Method

- ☐ 1. An existing pumping test that meets the requirements of wellhead protection rule part 4720.5520 and that was previously conducted on a public well in your water supply system.
 - ☐ 2. An existing pumping test that meets the requirements of wellhead protection rule part 4720.5520 and that was previously conducted on another well in a hydrogeologic setting determined by the department to be equivalent.
 - ☒ 3. A pumping test conducted on a new or existing public well in your water supply system and that meets the requirements for larger sized water systems (wellhead protection rule part 4720.5520).
 - ☐ 4. A pumping test conducted on a new or existing public well in your water supply system and that meets the requirements for smaller sized water systems (wellhead protection rule part 4720.5530).
 - ☐ 5. An existing pumping test that does not meet the requirements of wellhead protection rule part 4720.5520 and that was previously conducted on: 1) a public water supply well or 2) another well in a hydrogeologic setting determined by the department to be equivalent.
 - ☐ 6. An existing specific capacity test or specific capacity test for the public water supply well.
 - ☐ 7. An existing published transmissivity value.
- Include all pumping test data and the estimated transmissivity value when the aquifer test method proposed is one of those specified in Nos. 1, 2, 5, 6, or 7 listed above.



Test Description

Pumped Well Unique No: 206439

Test Duration (Hours): 24-24-24

Location - Township,
Range, Section, Quarters: 117, 21, 8, DCD

Pump Type: Vertical Turbine

Number of Observation Wells: 2

Discharge Rate: 1200 gal/min

☒ Confined ☐ Unconfined

Flow Rate Measuring
Device Type: _____

- You must include a map showing the location of the pumping well and observation well(s).

Rationale for Proposed Test Method

Briefly describe the rationale for method selected:

Municipal Well 11 (Unique Well No. 206439) will be used as the pumping well. Municipal Wells 13 and 17 (Unique Well Nos. 206424 and 147459 respectively) will be used as observation wells. The test will consist of a 24-hour background period, followed by a 24-hour pumping period, and a 24-hour recovery period. Municipal Wells that are open to the Mt. Simon-Hinckley Aquifer (Municipal Wells 11, 12, 13, and 17) will not be pumped for the duration of the 72-hour aquifer pump test, except Well 11 will be pumped continuously for 24 hours, during the pumping period.

Reviewed by: _____

Approved: ☐ Yes ☐ No

Approval Date: _____



TECHNICAL MEMORANDUM


3535 Vadnais Center Drive, St. Paul, MN 55110-5196

651.490.2000

800.325.2055

651.490.2150 FAX

TO: The File

FROM: Craig L. Kurtz, P.G. 

DATE: October 15, 2003

RE: St. Louis Park Aquifer Pumping Test
SEH No. A-STLOU0303.00

This Technical Memorandum summarizes the aquifer pumping test on the Mount Simon-Hinckley Aquifer conducted for the City of St. Louis Park, Minnesota. The test was conducted in accordance with the Wellhead Protection Rules (MN Rules Chapter 4720.5320 and 4720.5520) and the September 12, 2003 Aquifer Pumping Test Plan submitted to and approved by Minnesota Department of Health staff.

Test Description

The test was performed on October 5-11, 2003 and consisted of a 39-hour background phase, a 48-hour pumping phase, and a 48-hour recovery phase. Municipal Well 11 (MN Unique Well No. 206439) was used as the pumping well, and Municipal Well 17 (MN Unique Well No. 147459) was used as the observation well. Municipal Well 11 (the pumping well), in addition to Municipal Wells 12 and 13 (MN Unique Well Nos. 206456 and 206424 respectively) were also going to be used as observation wells; however, open and clear access into the wells' casings was not possible.

Municipal Wells 11 and 17 are open only to the Mount Simon and Hinckley Sandstone formations. The approximate distance between Municipal Well 11 and Municipal Well 17 is 5,700 feet.

An electronic pressure transducer and data logger was utilized to monitor and record the groundwater levels and drawdown in Municipal Well 17. Groundwater level readings were recorded linearly in Municipal Well 17 at intervals of one and five minutes. The approximate depth to static groundwater Municipal Well 17 was 385 feet below the access port of the casing.

Prior to the pumping phase of the test, Municipal Wells 11, 12, 13, and 17 were not used for at least 39 hours. The groundwater level recording equipment was installed in Municipal Well 17 between 9:00 a.m. and 10:00 a.m. on October 6, 2003. The 48-hour pumping phase of the test was started at 8:41 a.m. on October 7, 2003 and ended at 9:21 a.m. on October 9, 2003. During this phase, the pumping rate of Municipal Well 11 ranged from 1,184 to 1,368 gallons per minute (gpm) based on data from the digital totalizer and flow meter. The average pumping rate over the entire pumping phase of the test was 1,203 gpm. The pumping rates of the well during the test as recorded from the flow meter and calculated from the totalizer are attached. After the

pump of Municipal Well 11 was shut off, the recovery phase of the test lasted 48-hours, from 9:21 a.m. October 9 until 11:00 a.m. October 11, 2003.

It was determined at the end of the 48-hour pumping phase that the pressure transducer in Municipal Well 17 had malfunctioned and the recorded data from the pumping phase was unusable. However, the pressure transducer was serviced and reinstalled in Municipal Well 17 prior to the beginning of the 48-hour recovery phase. The groundwater level data collected during the recovery phase of the test was usable. Groundwater level data collected during the background, pumping and recovery phases of the test are saved on a computer disk enclosed with this Technical Memorandum. The maximum groundwater drawdown observed in the observation well (Municipal Well 17) was approximately 7.6 feet. The maximum groundwater drawdown in Municipal Well 11 could not be determined since the well's casing was inaccessible.

Data Analysis

The groundwater level recovery data from Municipal Well 17 was analyzed using AQTESOLV® software. The analysis consisted of matching the data to an appropriate type-curve resulting in a calculated transmissivity and storativity for the aquifer. A time-drawdown graph for the data collected from Municipal Well 17 during the recovery phase of the test is attached.

Results

Based on the results of the analysis, it appears that the aquifer is confined. The Theis (1935) solution was used to calculate a transmissivity and storativity. The transmissivity value calculated from the analysis of the recovery phase data from Municipal Well 17 was 1,970 ft²/day. The storativity value for the aquifer calculated from the analysis was 0.00017.

Conclusions

Although the data from the pumping phase of the aquifer pumping test was unusable, the data collected during the recovery phase appears adequate to estimate the hydraulic characteristics of the Mount Simon-Hinckley Aquifer in the St. Louis Park area. It appears that a confined-aquifer solution best represents the hydrogeologic conditions of the Mount Simon-Hinckley bedrock aquifer in the area of St. Louis Park. The representative transmissivity and storativity values to be used in the groundwater flow model for the City's Wellhead Protection Plan will be 1,970 ft²/day and 0.00017 respectively.

CLK/clk/PJK

Attachments: Pumping Rates Summary
 Time-Drawdown Graph
 Computer Disk (Groundwater Level Data)

c: Paul Kubesh, SEH Inc.

Scott Anderson, City of St. Louis Park

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**Pumping Rates
Mount Simon-Hinckley Aquifer Pumping
Test**

**St. Louis Park Wellhead Protection Plan
October 5-11, 2003**

Date	Time	Elapsed Time	Pumping Rate (gpm)
10/7/03	8:45	4	1368
10/7/03	8:50	9	1316
10/7/03	8:55	14	1329
10/7/03	9:00	19	1329
10/7/03	9:05	24	1316
10/7/03	9:10	29	1329
10/7/03	9:15	34	1303
10/7/03	9:20	39	1316
10/7/03	9:25	44	1303
10/7/03	9:30	49	1289
10/7/03	9:35	54	1289
10/7/03	9:40	59	1289
10/7/03	9:45	64	1289
10/7/03	11:33	172	1250
10/7/03	11:45	184	1237
10/7/03	14:25	344	1224
10/7/03	20:30	709	1211
10/8/03	8:15	1414	1197
10/8/03	19:25	2084	1184
10/9/03	9:15	2914	1184

Aquifer Pumping Test for Mt. Simon-Hinckley - Well 17 Recovery Data

Prepared By:

Prepared For:

SEH Inc.

City of St. Louis Park

Project:

Location:

A-STLOU0303.00

St. Louis Park, MN

Data Set: X:\...\well17recovery.aqt
Date: 10/13/03 Time: 11:19:15

SOLUTION

Aquifer Model: Confined
Solution Method: Theis
 $T = 1967.2 \text{ ft}^2/\text{day}$
 $S = 0.0001735$

AQUIFER DATA

Saturated Thickness: 263. ft
Anisotropy Ratio (K_z/K_r): 1.

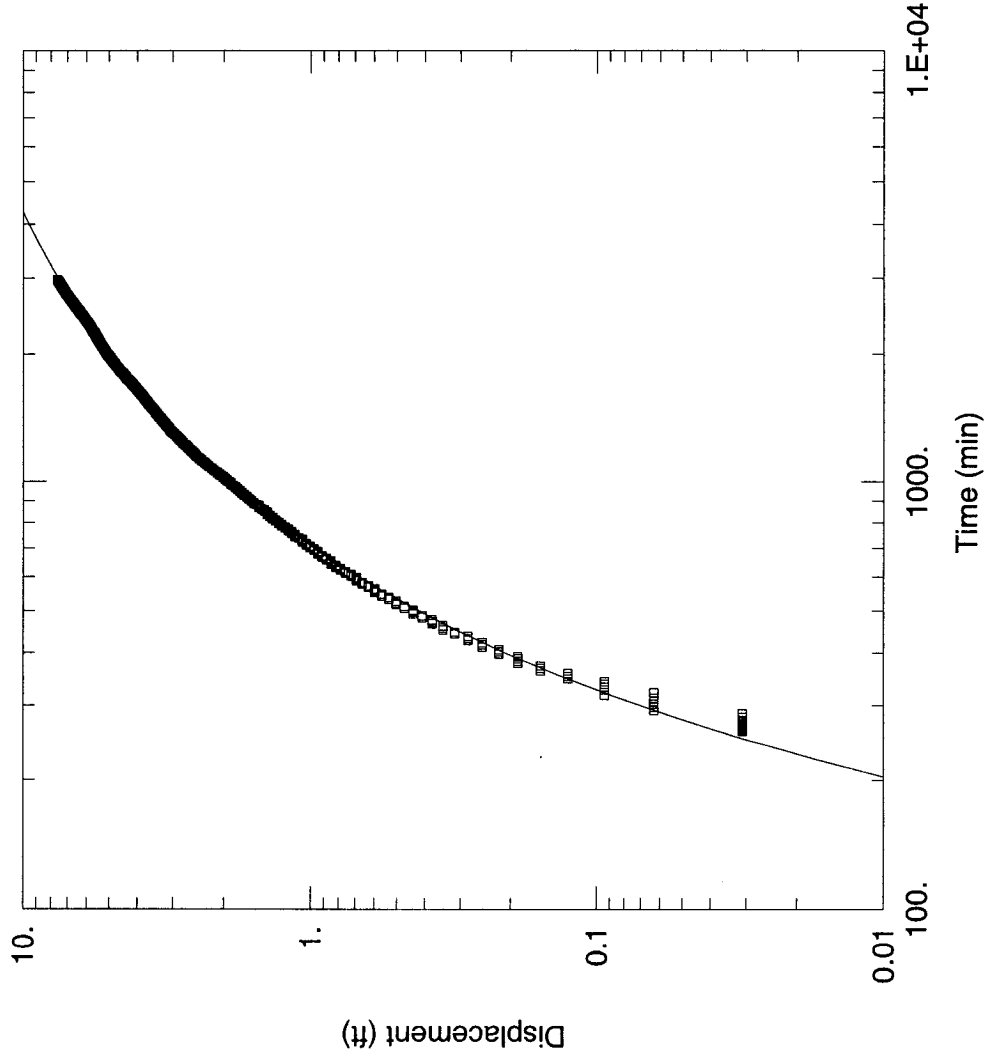
WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well 11	5364	3.068E+004

Observation Wells

Well Name	X (ft)	Y (ft)
Well 17	754.6	2.732E+004



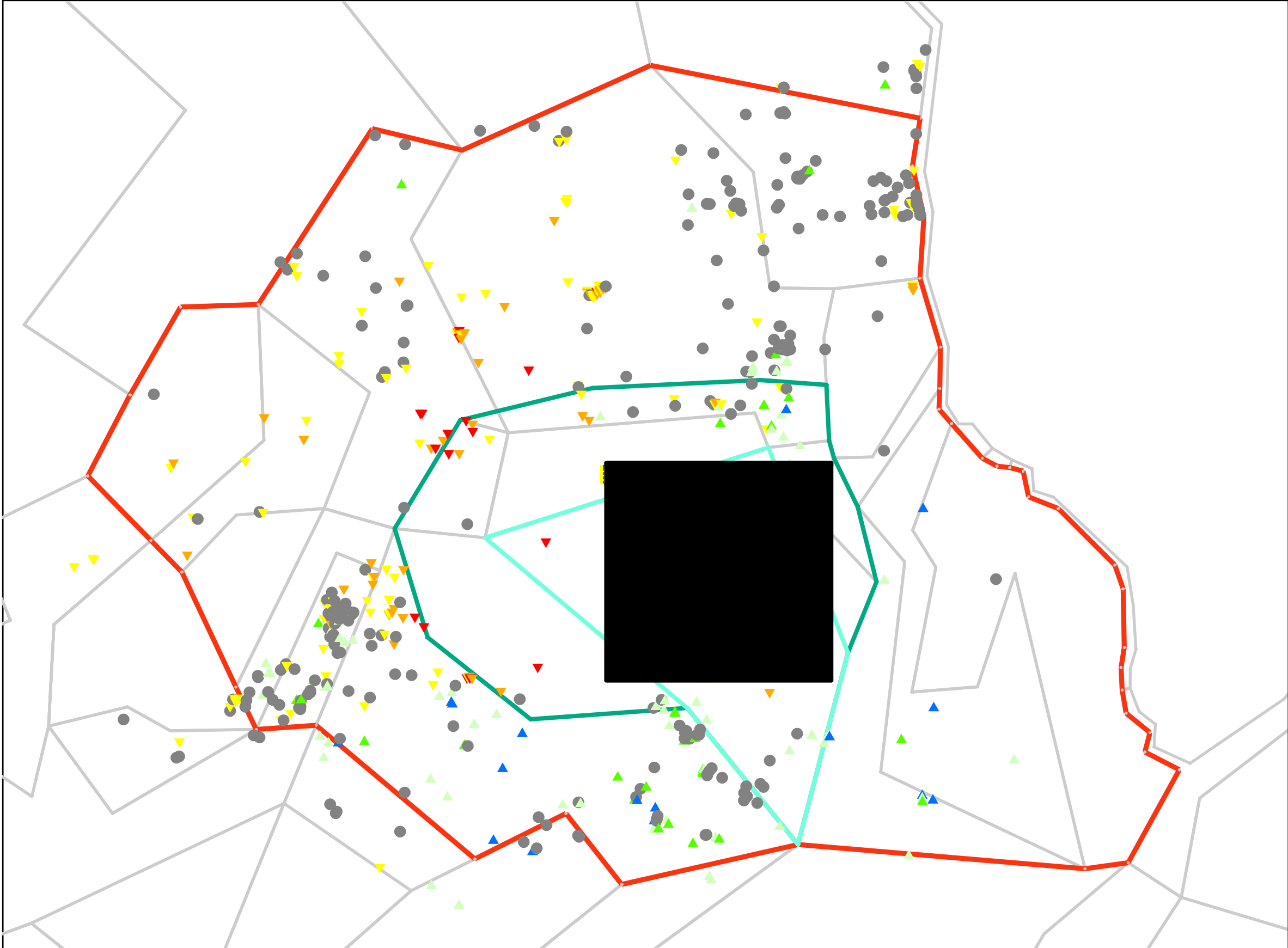
Appendix D

MLAEM Groundwater Flow Model Dataset

Appendix E

Model Calibration Results

Map Document: (X:\PT\Stlou\030300\GIS\Figure A_Layer2CalibrationDataset_Low.mxd) 1/30/2004 -- 8:49:19 AM sh



- Legend**
- St Louis Park City Boundary
 - Municipal Wells
 - St. Louis Park Inhomogeneity (St. Peter Model)
 - St. Louis Park Inhomogeneity (Prairie Du Chien-Jordan Model)
 - Model Polygon Mesh
 - Leaky Layer
- Mean Head Difference (meters)**
- 15.43 - -9.00
 - 9.00 - -6.00
 - 6.00 - -3.00
 - 3.00 - 3.00
 - 3.00 - 6.00
 - 6.00 - 9.00
 - 9.00 - 15.51

0 1 2 4 Miles

Source: SEH, MGS, Metro Counties & Metropolitan Council.

Projection:
UTM Zone 15 Meters
NAD83



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Project Number
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1/30/2004 sh

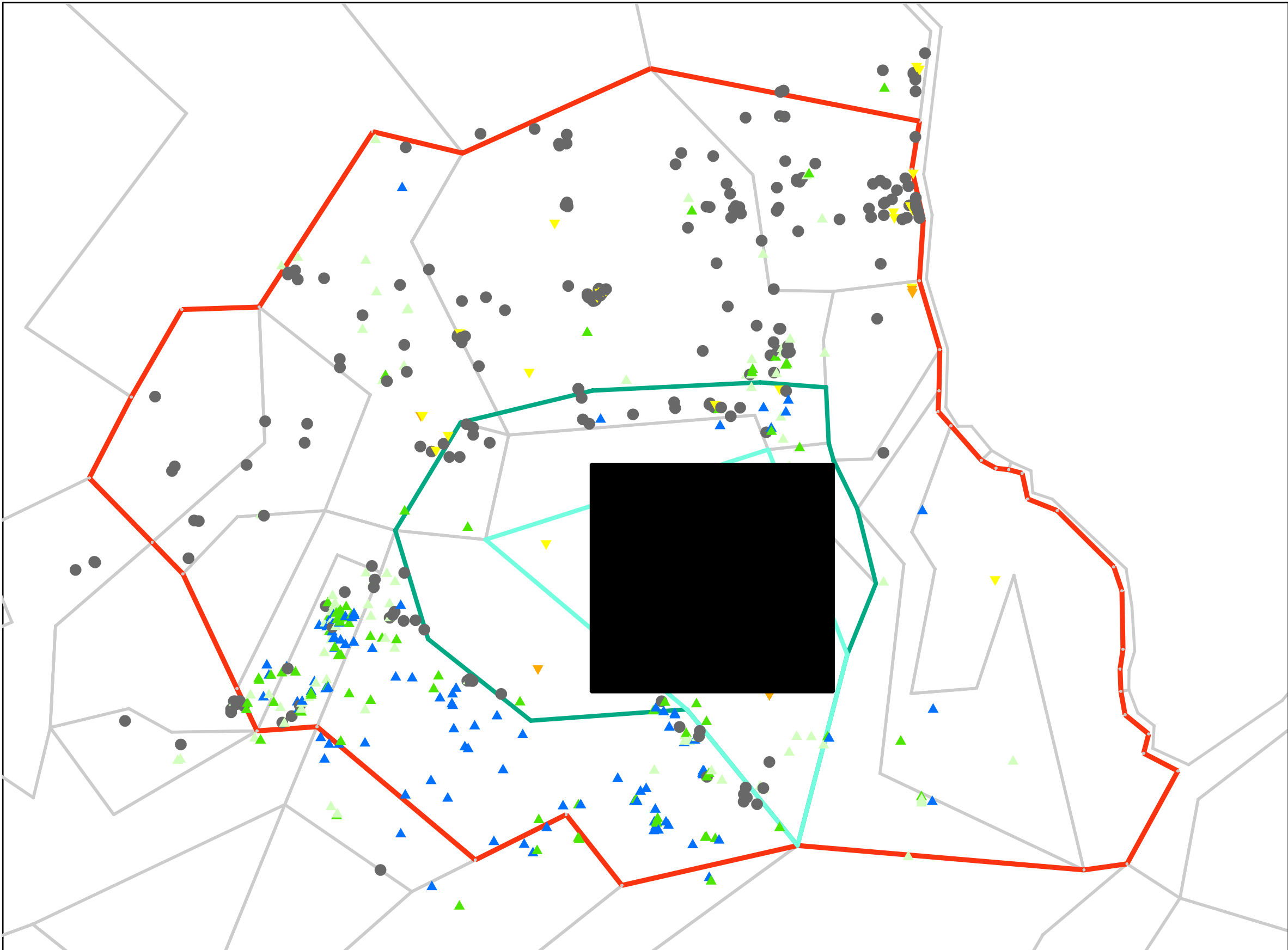
WELLHEAD PROTECTION PLAN - PART I

St. Louis Park, Minnesota

Layer 2
Calibration Dataset
(Low Permeability
Inhomogeneity)

Figure
A

Map Document: (V:\KOW\Minne021900\Gis\Minne0219\Figure B_Layer2CalibrationDataset_High.mxd) 1/30/2004 -- 8:54:49 AM sh



Legend

- St Louis Park City Boundary
- Municipal Wells
- St. Louis Park Inhomogeneity (St. Peter Model)
- St. Louis Park Inhomogeneity (Prairie Du Chien-Jordan Model)
- Model Polygon Mesh
- Leaky Layer

Mean Head Difference (meters)

- 9.25 - -9.00
- 9.00 - -6.00
- 6.00 - -3.00
- 3.00 - 3.00
- 3.00 - 6.00
- 6.00 - 9.00
- 9.00 - 21.67



Source: SEH, MGS, Metro Counties & Metropolitan Council.

Projection:
UTM Zone 15 Meters
NAD83



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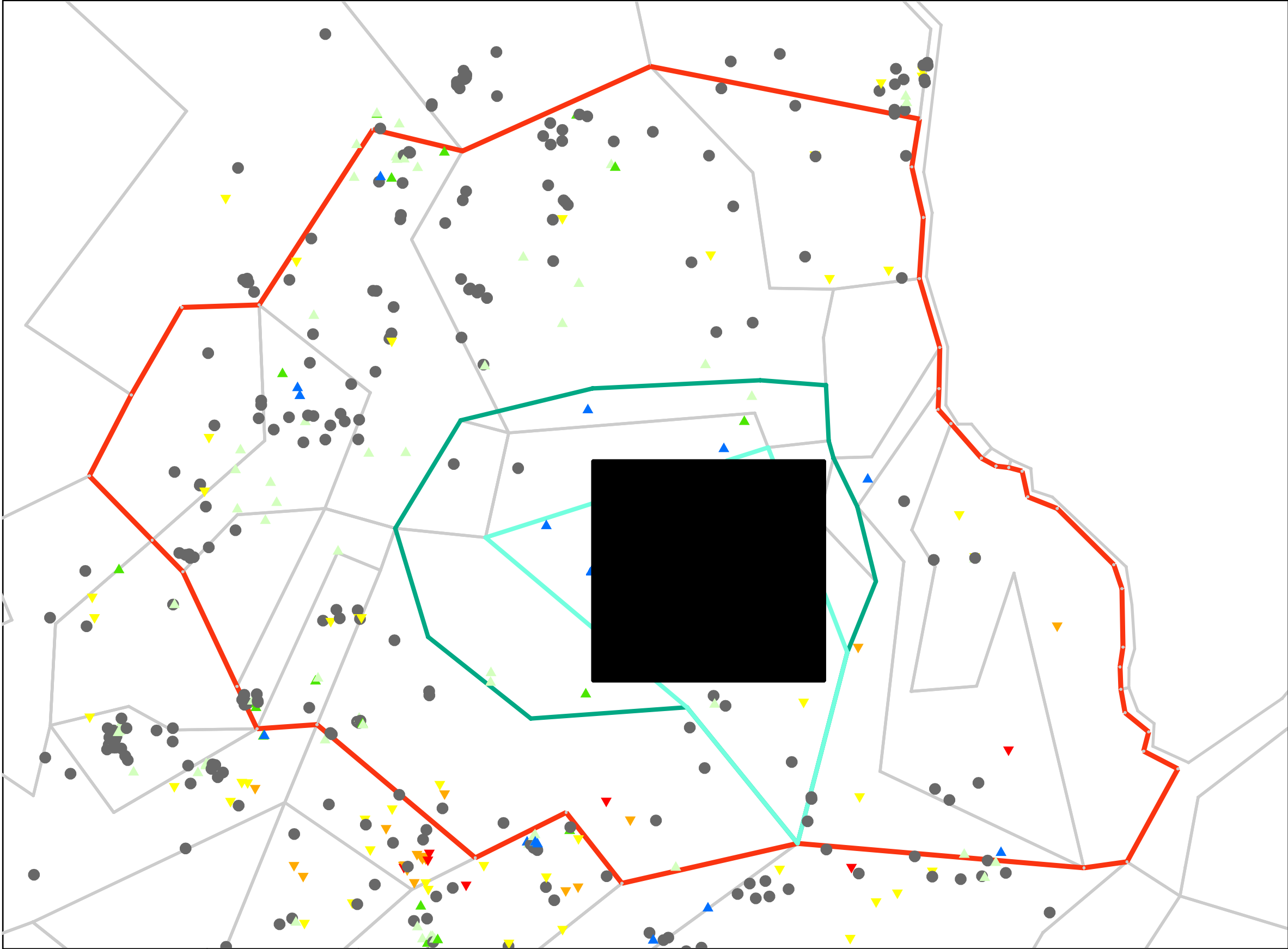
WELLHEAD PROTECTION PLAN - PART I

St. Louis Park, Minnesota














Layer 2
Calibration Dataset
(High Permeability
Inhomogeneity)

Figure
B

Map Document: (V:\KOW\Minne021900\Gis\Minne0219\Figure C_Layer3CalibrationDataset_Low.mxd) 1/30/2004 -- 8:09:51 AM sh



Legend

-  St Louis Park City Boundary
 -  Municipal Wells
 -  St. Louis Park Inhomogeneity (St. Peter Model)
 -  St. Louis Park Inhomogeneity (Prairie Du Chien-Jordan Model)
 -  Model Polygon Mesh
 -  Leaky Layer
- Mean Head Difference (meters)**
-  -12.93 - -9.00
 -  -9.00 - -6.00
 -  -6.00 - -3.00
 -  -3.00 - 3.00
 -  3.00 - 6.00
 -  6.00 - 9.00
 -  9.00 - 16.90

0 1 2 4 Miles

Source: SEH, MGS, Metro Counties & Metropolitan Council.

Projection:
UTM Zone 15 Meters
NAD83



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1/30/2004 sh

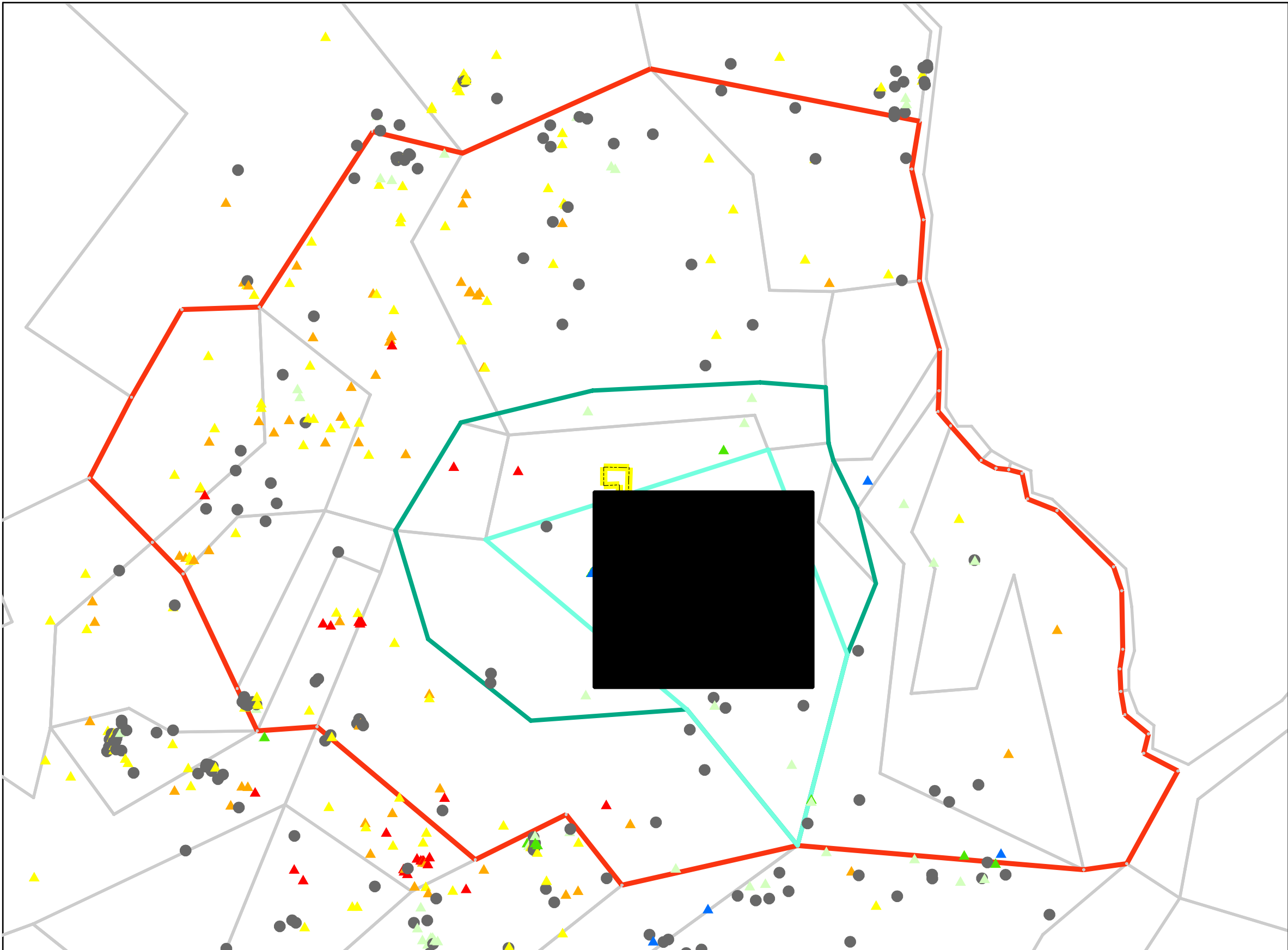
WELLHEAD PROTECTION PLAN - PART I

St. Louis Park, Minnesota

Layer 3
Calibration Dataset
(Low Permeability
Inhomogeneity)

Figure
C

Map Document: (V:\KOW\Minne021900\Gis\Minne0219\Figure D_Layer3CalibrationDataset_High.mxd) 1/30/2004 -- 8:10:12 AM sh



Legend

- St Louis Park City Boundary
- Municipal Wells
- St. Louis Park Inhomogeneity (St. Peter Model)
- St. Louis Park Inhomogeneity (Prairie Du Chien-Jordan Model)
- Model Polygon Mesh
- Leaky Layer
- Mean Head Difference (meters)**
 - 15.67 - -9.00
 - 9.00 - -6.00
 - 6.00 - -3.00
 - 3.00 - 3.00
 - 3.00 - 6.00
 - 6.00 - 9.00
 - 9.00 - 18.34

0 1 2 4 Miles

Source: SEH, MGS, Metro Counties & Metropolitan Council.

Projection:
UTM Zone 15 Meters
NAD83



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Project Number
ASTLOU0303.00

DATE
1/30/2004 sh

WELLHEAD PROTECTION PLAN - PART I

St. Louis Park, Minnesota

Layer 3
Calibration Dataset
(High Permeability
Inhomogeneity)

Figure
D

Appendix F

ArcView® GIS Files

Appendix G

MDH Well Vulnerability Scoring Sheets

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #3

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00206440

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 21 SECTION: 8 QUARTERS: DCDB

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	ST. PETER	
DNR Geologic Sensitivity Rating: H L	Score: 0	vulnerable
Geologic Data From	Well Record	
Year Constructed	1938	
Construction Method	Cable Tool/Bored	0
Casing Depth	103	10
Well Depth	286	
Casing grouted into borehole?	Unknown	0
Cement grout between casings?	Unknown	5
All casings extend to land surface?	Yes	0
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	900	10
Non-THMS VOCs detected?	Unknown	0
Pesticides detected?	Unknown	0
Maximum nitrate detected	<1.0 08/01/1975	0
Maximum tritium detected	Unknown	0
Carbon-14 age	Unknown	0

Wellhead Protection Score : 25
Wellhead Protection Vulnerability Rating: VULNERABLE

COMMENTS

High score is based on the well is cased only to the top of the hole into the St. Peter.

Platteville and open

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #4

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00200542

COUNTY: Hennepin TOWNSHIP NUMBER: 28 RANGE: 24 SECTION: 7 QUARTERS: BDAD

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	PRAIRIE DU CHIEN-JORDAN	
DNR Geologic Sensitivity Rating: VL L	Score: 0	0
Geologic Data From	Well Record	
Year Constructed	1946	
Construction Method	Cable Tool/Bored	0
Casing Depth	304	5
Well Depth	503	
Casing grouted into borehole?	Yes	0
Cement grout between casings?	Yes	0
All casings extend to land surface?	Yes	0
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	900	10
Non-THMS VOCs detected?	Vinyl Chloride	11/02/1996 vulnerable
Pesticides detected?	Unknown	0
Maximum nitrate detected	<1.0 08/01/1975	0
Maximum tritium detected	Unknown	0
Carbon-14 age	Unknown	0

Wellhead Protection Score : 15
Wellhead Protection Vulnerability Rating: VULNERABLE
Assessed By: WALSHJ1

COMMENTS
Very low score is based on the presence of the Glenwood and basal St. Peter confining layers. VULNERABLE BASED ON TRITIUM DATA FROM OTHER CITY WELLS.

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #5

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00203196

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 21 SECTION: 18 QUARTERS: DABA

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	PRAIRIE DU CHIEN-JORDAN	
DNR Geologic Sensitivity Rating: VL L	Score: 0	0
Geologic Data From	Well Record	
Year Constructed	1947	
Construction Method	Cable Tool/Bored	0
Casing Depth	305	5
Well Depth	465	
Casing grouted into borehole?	Yes	0
Cement grout between casings?	Yes	0
All casings extend to land surface?	Yes	0
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	1200	20
Non-THMS VOCs detected?	Unknown	0
Pesticides detected?	Unknown	0
Maximum nitrate detected	<1.0 08/01/1975	0
Maximum tritium detected	Unknown	0
Carbon-14 age	Unknown	0

Wellhead Protection Score : 25
Wellhead Protection Vulnerability Rating: VULNERABLE
Assessed By: WALSHJ

COMMENTS

Very low rating is based on the presence of the Glenwood and basal St. Peter confining layers. VULNERABLE RATING BASED ON TRITIUM RESULTS FOR OTHER CITY WELLS.

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #6

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00206457

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 21 SECTION: 21 QUARTERS: CDBD

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	PRAIRIE DU CHIEN-JORDAN	
DNR Geologic Sensitivity Rating: VL L	Score: 1	0
Geologic Data From	Well Record	
Year Constructed	1948	
Construction Method	Cable Tool/Bored	0
Casing Depth	303	5
Well Depth	482	
Casing grouted into borehole?	Yes	0
Cement grout between casings?	Yes	0
All casings extend to land surface?	Yes	0
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	1000	10
Non-THMS VOCs detected?	Unknown	0
Pesticides detected?	Unknown	0
Maximum nitrate detected	<0.4 04/12/1990	0
Maximum tritium detected	8.0 12/17/1991	vulnerable
Carbon-14 age	Unknown	0
Wellhead Protection Score		15
Wellhead Protection Vulnerability Rating:		VULNERABLE

COMMENTS

Very low rating is based on the presence of the Glenwood and basal St.Peter confining layers.

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #7

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00206436

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 21 SECTION: 8 QUARTERS: BDDA

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	PRAIRIE DU CHIEN-JORDAN	
DNR Geologic Sensitivity Rating: VL L	Score: 0	0
Geologic Data From	Well Record	
Year Constructed	1952	
Construction Method	Cable Tool/Bored	0
Casing Depth	247	5
Well Depth	446	
Casing grouted into borehole?	Yes	0
Cement grout between casings?	Yes	0
All casings extend to land surface?	Yes	0
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	1200	20
Non-THMS VOCs detected?	Unknown	0
Pesticides detected?	Unknown	0
Maximum nitrate detected	<1.0 08/01/1975	0
Maximum tritium detected	Unknown	0
Carbon-14 age	Unknown	0

Wellhead Protection Score : 25
Wellhead Protection Vulnerability Rating: NOT VULNERABLE

COMMENTS
Very low rating is based on the presence of the Glenwood and basal St.Peter confining layers.

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #8

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00203678

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 22 SECTION: 1 QUARTERS: DACD

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	PRAIRIE DU CHIEN-JORDAN	
DNR Geologic Sensitivity Rating: VL L	Score: 10	10
Geologic Data From	Well Record	
Year Constructed	1955	
Construction Method	Cable Tool/Bored	0
Casing Depth	343	5
Well Depth	507	
Casing grouted into borehole?	Unknown	0
Cement grout between casings?	Unknown	5
All casings extend to land surface?	Yes	0
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	1000	10
Non-THMS VOCs detected?	Unknown	0
Pesticides detected?	Unknown	0
Maximum nitrate detected	<0.4 04/12/1990	0
Maximum tritium detected	Unknown	0
Carbon-14 age	Unknown	0

Wellhead Protection Score : 30
Wellhead Protection Vulnerability Rating: NOT VULNERABLE

COMMENTS

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #9

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00206437

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 21 SECTION: 8 QUARTERS: BDDB

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	PRAIRIE DU CHIEN-JORDAN	
DNR Geologic Sensitivity Rating: VL L	Score: 5	15
Geologic Data From	Well Record	
Year Constructed	1956	
Construction Method	Cable Tool/Bored	0
Casing Depth	289	5
Well Depth	473	
Casing grouted into borehole?	Yes	0
Cement grout between casings?	Yes	0
All casings extend to land surface?	Yes	0
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	1200	20
Non-THMS VOCs detected?	Unknown	0
Pesticides detected?	Unknown	0
Maximum nitrate detected	<1.0 08/01/1975	0
Maximum tritium detected	Unknown	0
Carbon-14 age	Unknown	0
Wellhead Protection Score		40
Wellhead Protection Vulnerability Rating:		NOT VULNERABLE

COMMENTS

Very low score is based on the thickness of shale reported in the St. Peter Sandstone and does not include the presence of the Glenwood confining layer.

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #10

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00206442

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 21 SECTION: 8 QUARTERS: DCDB

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	PRAIRIE DU CHIEN-JORDAN	
DNR Geologic Sensitivity Rating: VL L	Score: 0	0
Geologic Data From	Well Record	
Year Constructed	1955	
Construction Method	Cable Tool/Bored	0
Casing Depth	316	5
Well Depth	500	
Casing grouted into borehole?	Yes	0
Cement grout between casings?	Yes	0
All casings extend to land surface?	Yes	0
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	800	10
Non-THMS VOCs detected?	Unknown	0
Pesticides detected?	Unknown	0
Maximum nitrate detected	<0.4 08/14/1991	0
Maximum tritium detected	Unknown	0
Carbon-14 age	Unknown	0

Wellhead Protection Score : 15
Wellhead Protection Vulnerability Rating: VULNERABLE
Assessed By: WALSHJ

COMMENTS
Very low rating is based on the presence of the Glenwood and St. Peter confining layers. Drift rating is L-2. VULNERABLE RATING BASED ON TRITIUM DATA FROM OTHER CITY WELLS.

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #11

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00206439

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 21 SECTION: 8 QUARTERS: DCDB

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	MT. SIMON	
DNR Geologic Sensitivity Rating: VL L	Score: 14	0
Geologic Data From	Well Record	
Year Constructed	1960	
Construction Method	Cable Tool/Bored	0
Casing Depth	880	0
Well Depth	1093	
Casing grouted into borehole?	Unknown	0
Cement grout between casings?	Unknown	5
All casings extend to land surface?	Yes	0
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	1000	10
Non-THMS VOCs detected?	Unknown	0
Pesticides detected?	Unknown	0
Maximum nitrate detected	0.1 01/15/1987	0
Maximum tritium detected	Unknown	0
Carbon-14 age	Ancient	-20
Wellhead Protection Score		-5
Wellhead Protection Vulnerability Rating:		NOT VULNERABLE

COMMENTS

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #12

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00206456

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 21 SECTION: 21 QUARTERS: CDBD

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	MT. SIMON	
DNR Geologic Sensitivity Rating: VL L	Score: 12	0
Geologic Data From	Well Record	
Year Constructed	1965	
Construction Method	Cable Tool/Bored	0
Casing Depth	900	0
Well Depth	1095	
Casing grouted into borehole?	Unknown	0
Cement grout between casings?	Unknown	5
All casings extend to land surface?	Yes	0
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	1000	10
Non-THMS VOCs detected?	Unknown	0
Pesticides detected?	Unknown	0
Maximum nitrate detected	<0.4 04/12/1990	0
Maximum tritium detected	Unknown	0
Carbon-14 age	Ancient	-20
Wellhead Protection Score		-5
Wellhead Protection Vulnerability Rating:		NOT VULNERABLE

COMMENTS

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #13

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00206424

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 21 SECTION: 4 QUARTERS: CCDA

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	MT. SIMON	
DNR Geologic Sensitivity Rating: VL L	Score: 14	0
Geologic Data From	Well Record	
Year Constructed	1964	
Construction Method	Cable Tool/Bored	0
Casing Depth	891	0
Well Depth	1045	
Casing grouted into borehole?	Yes	0
Cement grout between casings?	Yes	0
All casings extend to land surface?	Yes	0
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	1000	10
Non-THMS VOCs detected?	Unknown	0
Pesticides detected?	Unknown	0
Maximum nitrate detected	<0.4 04/12/1990	0
Maximum tritium detected	Unknown	0
Carbon-14 age	Ancient	-20
Wellhead Protection Score		-10
Wellhead Protection Vulnerability Rating:		NOT VULNERABLE

COMMENTS

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #14

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00227965

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 21 SECTION: 4 QUARTERS: CCDA

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	PRAIRIE DU CHIEN-JORDAN	
DNR Geologic Sensitivity Rating: L L	Score: 1	20
Geologic Data From	Data Inferred From Nearby Wells	
Year Constructed	1964	
Construction Method	Cable Tool/Bored	0
Casing Depth	389	5
Well Depth	485	
Casing grouted into borehole?	Yes	0
Cement grout between casings?	Yes	0
All casings extend to land surface?	No	10
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	1000	10
Non-THMS VOCs detected?	Trans-1,2-Dichloroethylen 06/06/1992 Cis-1,2-Dichloroethylene 06/06/1992 Trichloroethylene 06/06/1992	vulnerable
Pesticides detected?	Unknown	0
Maximum nitrate detected	<0.4 04/12/1990	0
Maximum tritium detected	10.1	vulnerable
Carbon-14 age	Modern	0
Wellhead Protection Score		45
Wellhead Protection Vulnerability Rating:		VULNERABLE

COMMENTS

L score is taken from the geologic log of city well # 13.

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #15

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00215447

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 21 SECTION: 8 QUARTERS: DCDB

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	JORDAN	
DNR Geologic Sensitivity Rating: VL L	Score: 0	0
Geologic Data From	Data Inferred From Nearby Wells	
Year Constructed	1969	
Construction Method	Unknown	5
Casing Depth	402	0
Well Depth	503	
Casing grouted into borehole?	Yes	0
Cement grout between casings?	Yes	0
All casings extend to land surface?	Yes	0
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	1200	20
Non-THMS VOCs detected?	Unknown	0
Pesticides detected?	Unknown	0
Maximum nitrate detected	<1.0 08/01/1975	0
Maximum tritium detected	Unknown	0
Carbon-14 age	Unknown	0

Wellhead Protection Score : 25
Wellhead Protection Vulnerability Rating: VULNERABLE
Assessed By: WALSHJ

COMMENTS

Very low rating is based on the presence of the Glenwood and St. layers. VULNERABLE BASED ON TRITIUM DATA FROM OTHER CITY WELLS.

Peter confining

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #16

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00203187

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 21 SECTION: 7 QUARTERS: BBAA

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	JORDAN	
DNR Geologic Sensitivity Rating: VL L	Score: 0	0
Geologic Data From	Well Record	
Year Constructed	1973	
Construction Method	Cable Tool/Bored	0
Casing Depth	425	0
Well Depth	500	
Casing grouted into borehole?	Yes	0
Cement grout between casings?	Yes	0
All casings extend to land surface?	Yes	0
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	1000	10
Non-THMS VOCs detected?	Unknown	0
Pesticides detected?	Unknown	0
Maximum nitrate detected	<1.0 08/01/1975	0
Maximum tritium detected	Unknown	0
Carbon-14 age	Unknown	0

Wellhead Protection Score : 10
Wellhead Protection Vulnerability Rating: VULNERABLE
Assessed By: WALSHJ

COMMENTS
Very low rating is based on the presence of the Glenwood and St. Peter confining layers. Drift score is L-2. VULNERABLE RATING BASED ON TRITIUM DATA FROM OTHER CITY WELLS.

PWSID : 1270050
SYSTEM NAME: Saint Louis Park
WELL NAME : Well #17

TIER : 2
WHP RANK : 0
UNIQUE WELL #: 00147459

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 21 SECTION: 18 QUARTERS: DABB

CRITERIA	DESCRIPTION	POINTS
Aquifer Name	MT. SIMON	
DNR Geologic Sensitivity Rating: VL L	Score: 13	0
Geologic Data From	Well Record	
Year Constructed	1983	
Construction Method	Cable Tool/Bored	0
Casing Depth	818	0
Well Depth	1085	
Casing grouted into borehole?	Yes	0
Cement grout between casings?	Yes	0
All casings extend to land surface?	Yes	0
Gravel-packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	Unknown	0
Isolation distance violations?	Unknown	0
Pumping Rate:	800	10
Non-THMS VOCs detected?	Unknown	0
Pesticides detected?	Unknown	0
Maximum nitrate detected	<0.1 06/18/1996	0
Maximum tritium detected	Unknown	0
Carbon-14 age	Ancient	-20
Wellhead Protection Score		-10
Wellhead Protection Vulnerability Rating:		NOT VULNERABLE

COMMENTS

Very low score is based on the thickness of the St. Lawrence and Eau Claire confining layers taken from a gamma log. This score does not reflect the thickness of the basal St. Peter confining layer.

Appendix B

Potential Contaminant Source Inventory Data

ST. PETER AQUIFER MAW

Unique#	Address		Name	Diameter	Static	Depth	Well Data			
	Number	Street					Code	Comments		
165585				4"	n/a	n/a	B	Locking cap 05/26/94		
200538				n/a	n/a	n/a	B	Sealed since 1962		
200541				4"	n/a	n/a	B	Capped not sealed 06/14/94		
200962				n/a	n/a	n/a	B	Sealed per Wm M. Gregg		
200993							?	W 23?		
201064							A	No such address 06/03/94		
201066							C	Card 05/27/94		
201067							C	Card 06/15/94		
203085						4"	n/a	n/a	B	Sealed Bergerson in Club House 92 or 93
203184									B	Sealed per owner 06/15/94
203185						12"	170'	560'	B	Connected S. Well 3rd Tee 05/13/94
203185						8"	n/a	500'	D	Connected N. Well E. of Club House 5/94
203186						n/a	n/a	n/a	B	Sealed 05/16/94
203189									B	No well per owner 05/23/94
203194									A	No such address 05/27/94
203195						4"	n/a	300'	D	Connected 05/17/94
203200									?	Hopkins
203602						2"	50'	125'	B	Sealed 10/9/94
203603									?	Hopkins
203605									?	Hopkins
203610									?	Edina
206331						n/a	n/a	n/a	B	Sealed #1 05/23/94
206422						2"	40'	48'	B	Sealed 11/19/93
206423						n/a	n/a	75'	B	Sealed 08/21/87
206434									A	Not located 05/17/94
206440						n/a	n/a	n/a	B	Sealed #2 05/23/94
206449						4"	41'	200'+	D	Open 05/19/94
206451						4"	27'	98'	B	Not sealed 05/17/94 Well 143?
206459									?	Edina
206460									?	Edina
206464									?	Edina

ST. PETER AQUIFER MAW

Unique#	Number	Street	Name	Diameter	Static	Depth	Code	Comments
206466							A	No such address 05/27/94
206477							?	Edina
206481							?	Hopkins
206483							?	Hopkins
206484							?	Edina
206486							?	Edina
206493							?	Edina
216029							C	Card 05/18/94
216051				4"	n/a	n/a	B	W27 ? 06/02/94 Open
216052				6"	n/a	18'	B	Sealed 04/12/90
216057							A	Not located 06/15/94
216058				2"	n/a	n/a	B	Open not sealed 05/23/94
216061							A	No such address
216064				3"	n/a	160'	B	Connected 05/23/94
216068							A	Bloomington
216069							A	No such address 05/26/94
216070							?	Hopkins
216072							A	?
216074							A	?
216075							A	Torn down 06/15/94
216076							A	Not located 05/27/94
216077							*	Which One? 06/02/94
216078				n/a	n/a	n/a	B	Sealed 06/03/94
216079							A	?
216080							A	not located 05/10/94
216086							A	not located 05/11/94
216089							C	Card 05/23/94
216090				71/2"	n/a	70'	B	Connected 05/19/94
216101							A	?
216102							A	?
216103							A	?

ST. PETER AQUIFER MAW

Unique#	Number	Street	Name	Diameter	Static	Depth	Code	Comments
216105							A	?
216108							A	?
218162							A	not located 05/10/94
218186								Edina
222944							A	No such address 06/14/94
227901							A	Not located 05/26/94
227957							A	Not located 05/26/94
227960							A	No such address 05/17/94
227961							A	Not located 06/02/94
231613				6"	n/a	n/a	B	Open 05/27/94
232501				2"	n/a	80'	B	Connected 05/13/94
232502							A	No such address
232503							A	Not located 05/17/94
232504							?	Edina
232505							A	Only 1 on property
232507				2"	n/a	n/a	B	Connected 05/16/94 not running
232508							C	Card 05/16/94
232509				4"	n/a	n/a	B	Connected 05/16/94
232510				n/a	n/a	n/a	B	Sealed before 1988
232511							C	Card 05/16/94, no answer 06/16/94
232512				4 1/2"	n/a	n/a	B	Connected 05/16/94
232513							C	Card 05/16/94
232517							?	Edina
232522				4"	n/a	n/a	B	Connected 06/16/94
232523							C	Card 05/16/94 must call 1st
232528				6"	n/a	n/a	B	Connected 05/17/94
232529							A	Not located 05/17/94
232530							A	Not located 05/17/94
232531				n/a	n/a	n/a	B	Sealed 1993
232532							C	Card 05/18/94
232533				4"	20'	120'	D	Connected 05/17/94

ST. PETER AQUIFER MAW

Unique#	Number	Street	Name	Diameter	Static	Depth	Code	Comments
232535				2"	17'	86'	B	Sealed 02/26/90
232536				n/a	n/a	n/a	B	Sealed before 1961, 06/16/94
232537							C	Card 05/17/94
232538							B	No well per owner 05/17/94
232546							B	Scott said don't do
232547							B	Scott said don't do
232549							C	Card 06/15/94
232550				2"	n/a	n/a	B	Open 05/26/94
232551							A	?
232552							C	Card 05/17/94, no answer 06/16/94
232553							A	Not located 05/17/94
232554							B	No well per owner 05/17/94
232555							A	Not located 05/17/94
232559							A	Not located 06/15/94
232560							C	Card 05/18/94
232564							A	SEE CARD 06/03/94
232565				2"	n/a	105'	B	Sealed 10/08/86
232566							A	No such address 05/18/94
232568							A	Not located 05/18/94
232569							A	Not located 05/19/94
232570							A	No such address
232572							A	Not located 06/15/94
232573							A	No such address
232575							C	Card 06/03/94
232576							A	Not located 05/23/94
232577							A	Not located 05/16/94
232578							A	No such address
232580				4"	n/a	n/a	B	Connected 06/16/94
232581				18th St.			A	No such address
232583				2"	n/a	n/a	B	Connected 05/19/94
232584				4"	n/a	n/a	B	Not sealed 06/16/94

ST. PETER AQUIFER MAW

Unique#	Number	Street	Name	Diameter	Static	Depth	Code	Comments
232585				2"	n/a	n/a	B	Connected 05/19/94
232586							A	Not located 05/23/94
232587				2"	60'	90'	B	Sealed 09/26/88
232588				n/a	n/a	n/a	B	Not sealed 06/03/94 not accessible
232589				2"	60'	74'	B	Sealed 06/09/92
232590				2"	34'	110'	B	Sealed 08/05/91
232591				2.5"	n/a	75'	B	Sealed 07/13/84
232592							C	Card left 05/13/94
232593				2"	n/a	n/a	B	Connected running 05/13/94
232594				3"	21'	56'	B	Sealed 05/14/93
232597				n/a	n/a	n/a	C	Card 05/26/94
232599							B	Golden Valley
232600							A	Not located 06/15/94
232601							C	Card 05/23/94
232602							B	Sealed per owner 05/27/94
232604				2"	n/a	n/a	B	Sealed 05/26/94
232606							A	Not located 05/26/94
232608							A	No such address
232609				3"	n/a	70'	B	Sealed 03/09/87
232610				2"	60'	65'	B	Sealed 12/18/90
232611				2"	30'	45'	B	Sealed 04/12/93
232612				n/a	n/a	n/a	B	Open 06/03/94
232616							B	Open per owner 05/27/94
232621				2"	45'	70'	B	Sealed 10/13/88
232622				n/a	n/a	n/a	B	Sealed 06/00/94
232624							A	No such address 05/27/94
232625				4"	n/a	n/a	B	Connected 06/16/94
232626							C	Card 05/27/94
232627				2"	25'	55'	B	Sealed 06/02/88
232628				n/a	n/a	n/a	B	Not accessible 06/14/94 Buried down
232629				2"	17'	53'	B	Sealed 06/13/89

ST. PETER AQUIFER MAW

Unique#	Number	Street	Name	Diameter	Static	Depth	Code	Comments
232630							C	Card 05/31/94
232631				n/a	n/a	n/a	B	Sealed since 1960 under pool
232632				3"	n/a	n/a	B	Connected 06/03/94
232633							C	Card 06/03/94
232634							A	Not located 06/03/94
232635							A	No such address 06/15/94
232636							C	Card 06/15/94
232637				4"	n/a	n/a	B	Connected 06/16/94
232638				2"	n/a	n/a	B	Connected 06/03/94
232640				n/a	n/a	n/a	B	Sealed
232641				2"	30'	65'	B	Sealed 06/27/88
232642				2"	n/a	80'	B	Sealed 03/26/86
232643							C	Card 05/18/94
232644				4"	36'	82'	B	Sealed 08/30/89
232645							C	Card 06/14/94
232653				4"	n/a	n/a	B	Connected 06/14/94
232654							A	No such address 06/14/94
232656							C	Card 05/26/94
232657							B	M.H. in yard possible well 06/14/94
232658							C	Card 06/15/94
232662				n/a	n/a	n/a	B	Not sealed 06/14/94
232663							C	Card 06/14/94
232665				n/a	n/a	n/a	B	Connected 05/13/94 rear steps lawn only
232668				3"	n/a	n/a	B	Connected not used 05/13/94
232671							A	Not located 05/10/94
232672							A	Not Located 05/13/94
232673							B	No well per owner 05/13/94
232674				6"	n/a	n/a	B	Connected lawn use 05/13/94
232675							C	Card left 05/13/94
232677				2"	n/a	118'	B	Sealed 07/20/93
232679				4 1/2"	n/a	n/a	B	Sealed 08/03/1987

ST. PETER AQUIFER MAW

Unique#	Number	Street	Name	Diameter	Static	Depth	Code	Comments
232680				n/a	n/a	n/a	B	Capped not properly sealed 05/27/94
232684				2"	60'	71'	B	Sealed 06/23/92
232685							C	Card 06/14/94
232686				4"	36'	108'	B	Sealed 02/15/90
232688							C	Card 05/19/94, no answer 06/16/94
232689							C	Card 05/17/94
232690				3"	n/a	n/a	B	Connected not used 05/13/94
232691							C	Card 05/16/94
232692				2"	n/a	60'	D	Not sealed 06/16/94
232693				n/a	n/a	n/a	B	Sealed before 1988
232694				2"	45'	85'	B	Sealed 07/07/86
232695							C	Card 06/15/94
232696				2"	48'	92'	B	Sealed 12/01/89
232697				4"	36'	108'	B	Sealed 02/15/90
232698				2"	n/a	n/a	B	Sealed 08/26/86
232699				n/a	n/a	n/a	B	Sealed per owner before 1989
232700							?	Edina
232701							A	Not located 05/27/94
232702				4"	n/a	90'	B	Connected 05/13/94
232703				1.25"	n/a	24'	B	Sealed 03/01/93
232704							C	Card 05/16/94, no answer 06/16/94
232705				2"	20'	38'	B	Sealed 04/09/90
232706							?	Hopkins
232708							?	Hopkins
232709							?	Hopkins
232710							?	Hopkins
232712				4"	20'	112'	B	Sealed 09/25/92
232713							?	Hopkins
232714							?	Hopkins
232715							?	Hopkins
232717							?	Hopkins

ST. PETER AQUIFER MAW

Unique#	Number	Street	Name	Diameter	Static	Depth	Code	Comments
232718							?	Hopkins
232719							?	Hopkins
232720							?	Hopkins
232721							?	Hopkins
232723							?	Hopkins
232724							A	No such address 05/31/94
232725							?	Hopkins
232737				4"	20'	86'	B	Sealed 8/13/92
232738				9"	n/a	80'	B	Connected 05/17/94
232742				4"	50'	72'	B	Sealed 01/23/91
232744				n/a	n/a	n/a	B	Sealed 05/31/94 under driveway
232745				n/a	n/a	n/a	B	Sealed 05/27/94
232746							B	Sealed per owner 05/16/94
232747				2"	n/a	n/a	B	Sealed 09/16/86
232748							B	Sealed per owner
232749				2"	n/a	n/a	B	* Not Sealed Properly 05/16/94
232750							B	Not located per owner 05/23/94
232752							B	No well per owner 06/15/94
232753				2"	n/a	n/a	B	Connected 06/02/94
232755				2"	n/a	80'	D	8/26/1994
232757							B	Sealed per owner
232759				n/a	n/a	n/a	B	Sealed per owner
232761							A	No such address 05/27/94
232762				2"	50'	75'	B	Sealed 09/10/93
232763							C	Card left 05/13/94
232764							B	Not located 05/31/94 per inspections
232766							A	No such address
232767				2"	n/a	70'	B	Sealed 02/10/89
232769				4"	n/a	n/a	B	Connected 06/15/94
232770				3"	n/a	n/a	B	Capped Not sealed 06/03/94
232772				2"	105'	115'	B	Sealed 11/20/90

ST. PETER AQUIFER MAW

Unique#	Number	Street	Name	Diameter	Static	Depth	Code	Comments
232773							A	Same as 5719 Goodrich
232774							B	No Well per owner 05/18/94
232775							C	Card 06/03/94
232776							C	Card 06/03/94
232777							C	Card 06/03/94
232778				n/a	n/a	n/a	B	Sealed 06/02/94
232779							C	Card 05/31/94
232781				n/a	n/a	n/a	B	Open 05/27/94
232782							C	Card 05/16/94
232783				1 1/4"	n/a	21'	B	Sealed 05/24/90
232784				2"	n/a	60'	B	Sealed 02/26/88
232786							C	Card 05/31/94
232787				n/a	n/a	n/a	B	Sealed 06/16/94
232788				2"	50'	75'	B	Sealed 06/20/91
232789							C	Card 05/27/94
232790				2"	45'	52'	B	Sealed 01/22/91
232792				n/a	n/a	n/a	B	Sealed 05/18/94
232793							B	No well per owner 05/26/94
232794							C	Card 05/27/94
232795				3"	50'	180'	B	Sealed 06/00/42
232796				n/a	n/a	n/a	B	Sealed per owner 05/19/94
232797				n/a	n/a	n/a	B	Sealed per owner 05/23/94
232798							C	Card 05/17/94
232799				4"	n/a	n/a	B	Sealed 05/19/94
232800							B	Sealed per owner 05/16/94
232801							C	Card 05/27/94
232803							C	Card 05/26/94
232804				2"	35'	60'	B	Sealed 03/15/88
232805							C	Card 06/02/94
232806				n/a	n/a	n/a	B	Connected 05/27/94
232807							C	Card 05/13/94

ST. PETER AQUIFER MAW

Unique#	Number	Street	Name	Diameter	Static	Depth	Code	Comments
232808				n/a	n/a	n/a	B	Sealed 05/31/94
232811							C	Card 06/02/94
232812							C	Card 05/26/94
232813							C	Card 05/27/94
232814				4"	n/a	n/a	B	Connected 06/03/94
232815				n/a	n/a	n/a	B	Sealed 06/03/94
232816				3"	n/a	n/a	B	Not sealed properly 05/18/94
232817							B	No well per owner 05/13/94
232818				4"	n/a	60'	B	Connected 06/15/94
232819							C	Card 06/14/94
232820							C	Card left 05/13/94
232821							C	Card 05/26/94
232823							C	Card 05/27/94
232824				2"	80'	100'	B	Sealed 09/16/88
232825							A	Not located 05/31/94
232826							C	Card 06/14/94
232827				2"	n/a	70'	B	Sealed 05/03/88
232828				3"	80'	120'	B	Sealed 09/18/89
232829							C	Card 06/03/94
232831				2"	n/a	n/a	B	Not sealed 05/31/94 owner puts stuff in it
232832							C	Card 06/15/94
232833				2"	n/a	n/a	B	Capped 05/31/94 not sealed
232834							C	Card left 05/13/94
232836				3"	n/a	n/a	B	Connected lawn use 05/13/94
232837				4"	27'	110'	B	Sealed 09/30/90
232838							A	not located 01/30/92 per State Health Dept
232839				2"	50'	100'	B	Sealed 08/02/90
232841							B	No well per owner 05/16/94
232842				n/a	n/a	n/a	B	Connected 06/16/94 not using
232843				2"	n/a	n/a	B	Connected 06/14/94 not used
232844							C	Card 05/26/94

ST. PETER AQUIFER MAW

Unique#	Number	Street	Name	Diameter	Static	Depth	Code	Comments
232845				2"	n/a	90'	B	Sealed 05/05/88
232846				4"	n/a	210'	B	Connected 05/18/94
232847				n/a	n/a	n/a	B	Sealed 05/27/94
232848				2"	n/a	n/a	B	Not sealed properly 05/10/94
232849							C	Card 05/27/94
232850							C	Card 05/18/94
232851				2"	55'	80'	B	Sealed 09/26/90
232852						100	D	
232855								
232856						156	D	
232859								
232861						106	D	
232864						86	D	
232865								
232866								
232867								
232868								
232869								
232870								
232871								
232873								
232874								
232875						80	D	
232877						100	D	
232878								
232880						100	D	
232881								
232882								
232883								
232885								
232889								

ST. PETER AQUIFER MAW

Unique#	Number	Street	Name	Diameter	Static	Depth	Code	Comments
232890								
232892								
232893								
232894								
232895								
232900								
232901								
232902						84	D	
232903								
232905								
232906								
232910								
232911								
232912								
232914								
232915						150	D	
232916								
232917								
232918								
232919								
232921								
232922								
232923								
232924								
232926								
232927								
232932								
232933								
232934						80	D	
232935							D	
232936								

ST. PETER AQUIFER MAW

Unique#	Number	Street	Name	Diameter	Static Depth	Code	Comments
232937							
232938					140	D	
232940							
232946					170	D	
232947					150	D	
232948					175	D	
232949					100	D	
232952							
232956					80	D	
232961							
232962					80	D	
232964							
232971					75	D	
232977							
232982							
233308							
233309							
233311						B	No Access 10'
233312							
233313							
233314							
233317							
233318							
233319							
233320							
233323							
233326							
233328							
233331							
233332							
233334							

ST. PETER AQUIFER MAW

Unique#	Number	Street	Name	Diameter	Static Depth	Code	Comments
233335							
233336							
233337							
233338							
233340							
233341							
233342							
233344							
233345							
233347							
233348							
233349							
233351							
233352							
233353							
233354							
233356							
233357							
233358							
233359							
233360							
233362							
233364							
233365							

WELL DATA

				Well Data								
RAP	Proj#	Unique#	Number	Address		Name	Diameter	Static	Depth	Code	Comments	
D	53	216071		<div></div>			6"	n/a	n/a	D	Open S.E. Packing Building 06/02/94	
D	77	216091				4"	56'	119'	B	Sealed 10/05/88		
D		216104									A	
D	110	216106									A	Not located 05/31/94
D	144	216128									A	?
D		232514									A	not located 05/10/94
D		232515									A	Not located 05/16/94
D		232516									A	Not located 05/16/94
D		232518									B	Not located 05/10/94
D		232519									B	not located 05/10/94
D		232521									B	not located 05/10/94
D		232539									A	not located 05/10/94
D		232540									A	not located 05/10/94
D		232541									A	not located 05/10/94
D		232542									A	not located 05/10/94
D		232543									A	not located 05/10/94
D		232548									B	No well per controller 05/17/94
D		232556									B	No well per owner 05/17/94
D		232557									C	Card 05/17/94
D		232558									C	Card 05/17/94
D		232571							A	No such address		
D		232574							A	not located 05/10/94		

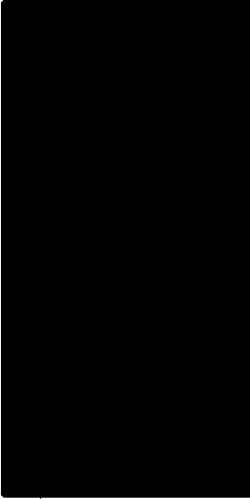
WELL DATA

RAP Proj#	Unique#	Number	Street	Name	Diameter	Static Depth	Code	Comments
D	232579						A	No such address
D	232582				n/a	n/a	B	Sealed 05/26/94
D	232595				4"	n/a	D	Connected 06/14/94
D	232598						A	Not located 06/14/94
D	232605				n/a	n/a	B	Sealed 05/26/94
D	232607						C	Card 05/26/94 2930 Louisiana
D	232615						B	No well per owner 05/27/94
D	232617				2"	70'	B	Sealed 01/14/92
D	232618				2"	35'	B	Sealed 03/24/88
D	232619						A	Not located 05/27/94
D	232620						A	House torn down 05/27/94
D	232623				2"	n/a	B	Sealed 02/14/89
D	232648						B	No well per manager 05/19/94
D	232649						A	No such address
D	232650						C	Card 05/27/94
D	232651						C	Card 06/14/94
D	232660						C	Card 06/14/94
D	232661						A	Not located 06/14/94
D	232669						C	Card left 05/13/94
D	232670						B	not located 12/08/87 Stodola Well Co.
D	232681						A	not located 05/12/94
D	232683						A	Not located 05/10/94

WELL DATA

RAP Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Code	Comments
D	232707							A	Not located 05/17/94
D	232741							C	Card 05/27/94
D	232751							C	Card 05/16/94
D	232760				1 1/4"	n/a	22'	B	Sealed 03/18/88
D	232771							C	Card 05/26/94
D	232780				n/a	n/a	n/a	B	Unsure if sealed 05/17/94 debris in pit
D	232791							C	Card 05/26/94
D	232810				n/a	n/a	n/a	B	Sealed 05/19/94
D	232862								
D	232896								
D	232904								
D	232908								
D	232920								
D	232950								
D	232951								
D	232972								
D	232981								
D	232988								
D	232992								
D	233321								
D	233324								
D	233325								

WELL DATA

RAP Proj#	Unique#	Number	Street	Name	Diameter	Static Depth Code	Comments
D	233328						
D	233339						
D	233346						
D	233355						

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
1											
2	RAP	Proj#	Unique#	Number	Address	Name	Diameter	Static	Depth	Status	Well Data
3	10.2.1		165585				4"	n/a	n/a	L/C	Locking cap 05/26/94
4			200538				n/a	n/a	n/a	S	Sealed since 1962
5		44	200541				4"	n/a	n/a	N/S	Capped not sealed 06/14/94
6		SLP2	200962				n/a	n/a	n/a	S	Sealed per Wm M. Gregg
7		22	200993							?	W 23?
8			201064							?	No such address 06/03/94
9			201066							B	Card 05/27/94
10			201067							A	Card 06/15/94
11			203085				4"	n/a	n/a	S	Sealed Bergerson in Club House 92 or 93
12			203184							S/P/O	Sealed per owner 06/15/94
13			203185				12"	170'	560'	C	Connected S. Well 3rd Tee 05/13/94
14			203185				8"	n/a	500'	C	Connected N. Well E. of Club House 5/94
15			203186				n/a	n/a	n/a	S	Sealed 05/16/94
16		91	203189							N/W/O	No well per owner 05/23/94
17		92	203194							?	No such address 05/27/94
18			203195				4"	n/a	300'	C	Connected 05/17/94
19		93	203200							?	Hopkins
20		94	203602				2"	50'	125'	S	Sealed 10/9/94
21			203603							?	Hopkins
22		95	203605							?	Hopkins
23			203610							?	Edina

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
2	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
24			206331				n/a	n/a	n/a	S	Sealed #1 05/23/94
25			206422				2"	40'	48'	S	Sealed 11/19/93
26			206423				n/a	n/a	75'	S	Sealed 08/21/87
27			206434							N/L	Not located 05/17/94
28		SLP3	206440				n/a	n/a	n/a	S	Sealed #2 05/23/94
29			206449				4"	41'	200'+	O	Open 05/19/94
30	10.2.1	65	206451				4"	27'	98'	L/C	Not sealed 05/17/94 Well 143?
31		96	206459							?	Edina
32			206460							?	Edina
33			206464							?	Edina
34		97	206466							?	No such address 05/27/94
35			206477							?	Edina
36			206481							?	Hopkins
37			206483							?	Hopkins
38			206484							?	Edina
39			206486							?	Edina
40			206493							?	Edina
41	10.2.1	108	216029							A	Card 05/18/94
42		143	216051				4"	n/a	n/a	O	W27 ? 06/02/94 Open
43		27	216052				6"	n/a	18'	S	Sealed 04/12/90
44	10.2.1	35	216057							N/L	Not located 06/15/94
45		36	216058				2"	n/a	n/a	O	Open not sealed 05/23/94

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
2	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
46		39	216061							?	No such address
47	10.2.1		216064				3"	n/a	160'	C	Connected 05/23/94
48		50	216068							?	Bloomington
49		51	216069							?	No such address 05/26/94
50		52	216070							?	Hopkins
51	10.2.1	53	216071				6"	n/a	n/a	O	Open S.E. Packing Building 06/02/94
52	10.2.1	53	216071				6"	n/a	500'	O	Open N.E. Corner Building 06/02/94
53		54	216072							?	?
54		56	216074							?	?
55	10.2.1	57	216075							N/L	Torn down 06/15/94
56	10.2.1	58	216076							N/L	Not located 05/27/94
57		59	216077							*	Which One? 06/02/94
58		60	216078				n/a	n/a	n/a	S	Sealed 06/03/94
59	10.2.1	61	216079							?	?
60		63	216080							N/L	not located 05/10/94
61		73	216086							N/L	not located 05/11/94
62	10.2.1	75	216089							A	Card 05/23/94
63	10.2.1	76	216090				7 1/2"	n/a	70'	C	Connected 05/19/94
64	10.2.1	77	216091				4"	56'	119'	S	Sealed 10/05/88
65			216101							?	?
66	10.2.1	104	216102							?	?
67		106	216103							?	?

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
2	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
68	10.2.1	109	216105							?	?
69	10.2.1	110	216106							N/L	Not located 05/31/94
70		114	216108							?	?
71		144	216128							?	?
72	10.2.1		218162							N/L	not located 05/10/94
73			218186							?	Edina
74	10.2.1		222944							?	No such address 06/14/94
75	10.2.1		227901							N/L	Not located 05/26/94
76		200	227957							N/L	Not located 05/26/94
77		125	227960							?	No such address 05/17/94
78	10.2.1	211	227961							N/L	Not located 06/02/94
79			231613				6"	n/a	n/a	O	Open 05/27/94
80	10.2.1		232501				2"	n/a	80'	C	Connected 05/13/94
81	10.2.1		232502							?	No such address
82	10.2.1		232503							N/L	Not located 05/17/94
83			232504							?	Edina
84			232505							?	Only 1 on property
85			232507				2"	n/a	n/a	C	Connected 05/16/94 not running
86			232508							B	Card 05/16/94
87			232509				4"	n/a	n/a	C	Connected 05/16/94
88			232510				n/a	n/a	n/a	S	Sealed before 1988
89	10.2.1		232511							B	Card 05/16/94, no answer 06/16/94

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
2	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
90	10.2.1		232512				4 1/2"	n/a	n/a	C	Connected 05/16/94
91	10.2.1		232513							A	Card 05/16/94
92	10.2.1		232514							N/L	not located 05/10/94
93	10.2.1		232515							N/L	Not located 05/16/94
94	10.2.1		232516							N/L	Not located 05/16/94
95			232517							?	Edina
96	10.2.1		232518							N/L	Not located 05/10/94
97	10.2.1		232519							N/L	not located 05/10/94
98	10.2.1		232521							N/L	not located 05/10/94
99			232522				4"	n/a	n/a	C	Connected 06/16/94
100			232523							B	Card 05/16/94 must call 1st
101			232528				6"	n/a	n/a	C	Connected 05/17/94
102			232529							N/L	Not located 05/17/94
103			232530							N/L	Not located 05/17/94
104			232531				n/a	n/a	n/a	S	Sealed 1993
105	10.2.1		232532							A	Card 05/18/94
106			232533				4"	20'	120'	C	Connected 05/17/94
107			232535				2"	17'	86'	S	Sealed 02/26/90
108			232536				n/a	n/a	n/a	S	Sealed before 1961, 06/16/94
109			232537							B	Card 05/17/94
110			232538							N/W/O	No well per owner 05/17/94
111	10.2.1		232539							N/L	not located 05/10/94

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
112	10.2.1		232540							N/L	not located 05/10/94
113	10.2.1		232541							N/L	not located 05/10/94
114	10.2.1		232542							N/L	not located 05/10/94
115	10.2.1		232543							N/L	not located 05/10/94
116			232546							?	Scott said don't do
117			232547							?	Scott said don't do
118			232548							N/W/O	No well per controller 05/17/94
119	10.2.1		232549							A	Card 06/15/94
120	10.2.1		232550				2"	n/a	n/a	O	Open 05/26/94
121			232551							?	?
122			232552							B	Card 05/17/94, no answer 06/16/94
123			232553							N/L	Not located 05/17/94
124			232554							N/W/O	No well per owner 05/17/94
125			232555							N/L	Not located 05/17/94
126			232556							N/W/O	No well per owner 05/17/94
127			232557							B	Card 05/17/94
128			232558							A	Card 05/17/94
129			232559							N/L	Not located 06/15/94
130			232560							A	Card 05/18/94
131	10.2.1		232564							N/L	SEE CARD 06/03/94
132	10.2.1		232565				2"	n/a	105'	S	Sealed 10/08/86
133			232566							?	No such address 05/16/94

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
2	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
134	10.2.1		232568							N/L	Not located 05/18/94
135	10.2.1		232569							N/L	Not located 05/19/94
136			232570							?	No such address
137			232571							?	No such address
138			232572							N/L	Not located 06/15/94
139			232573							?	No such address
140			232574							N/L	not located 05/10/94
141	10.2.1		232575							A	Card 06/03/94
142	10.2.1		232576							N/L	Not located 05/23/94
143			232577							N/L	Not located 05/16/94
144			232578							?	No such address
145			232579							?	No such address
146			232580				4"	n/a	n/a	C	Connected 06/16/94
147			232581							?	No such address
148	10.2.1		232582				n/a	n/a	n/a	S	Sealed 05/26/94
149			232583				2"	n/a	n/a	C	Connected 05/19/94
150			232584				4"	n/a	n/a	N/S	Not sealed 06/16/94
151			232585				2"	n/a	n/a	C	Connected 05/19/94
152			232586							N/L	Not located 05/23/94
153			232587				2"	60'	90'	S	Sealed 09/26/88
154			232588				n/a	n/a	n/a	N/S	Not sealed 06/03/94 not accessible
155	10.2.1		232589				2"	60'	74'	S	Sealed 06/09/92

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
2	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
156	10.2.1		232590				2"	34'	110'	S	Sealed 08/05/91
157	10.2.1		232591				2.5"	n/a	75'	S	Sealed 07/13/84
158	10.2.1		232592							A	Card left 05/13/94
159			232593				2"	n/a	n/a	C	Connected running 05/13/94
160			232594				3"	21'	56'	S	Sealed 05/14/93
161	10.2.1		232595				4"	n/a	110'	C	Connected 06/14/94
162	10.2.1		232597				n/a	n/a	n/a	N/S	Card 05/26/94
163	10.2.1		232598							N/L	Not located 06/14/94
164	10.2.1		232599							?	Golden Valley
165			232600							N/L	Not located 06/15/94
166	10.2.1		232601							A	Card 05/23/94
167	10.2.1		232602							S/P/O	Sealed per owner 05/27/94
168	10.2.1		232604				2"	n/a	n/a	S	Sealed 05/26/94
169	10.2.1		232605				n/a	n/a	n/a	S	Sealed 05/26/94
170	10.2.1		232606							N/L	Not located 05/26/94
171	10.2.1		232607							B	Card 05/26/94 2930 Louisiana
172			232608							?	No such address
173	10.2.1		232609				3"	n/a	70'	S	Sealed 03/09/87
174	10.2.1		232610				2"	60'	65'	S	Sealed 12/18/90
175	10.2.1		232611				2"	30'	45'	S	Sealed 04/12/93
176	10.2.1		232612				n/a	n/a	n/a	O	Open 06/03/94
177			232615							N/W/O	No well per owner 05/27/94

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
178			232616							O	Open per owner 05/27/94
179	102.1		232617				2"	70'	85'	S	Sealed 01/14/92
180	102.1		232618				2"	35'	60'	S	Sealed 03/24/88
181	102.1		232619							N/L	Not located 05/27/94
182	102.1		232620							?	House torn down 05/27/94
183	102.1		232621				2"	45'	70'	S	Sealed 10/13/88
184	102.1		232622				n/a	n/a	n/a	S	Sealed 06/00/94
185	102.1		232623				2"	n/a	55'	S	Sealed 02/14/89
186	102.1		232624							?	No such address 05/27/94
187			232625				4"	n/a	n/a	C	Connected 06/16/94
188			232626							B	Card 05/27/94
189			232627				2"	25'	55'	S	Sealed 06/02/88
190	102.1		232628				n/a	n/a	n/a	N/S	Not accessible 06/14/94 Buried down
191			232629				2"	17'	53'	S	Sealed 06/13/89
192			232630							A	Card 05/31/94
193	102.1		232631				n/a	n/a	n/a	S	Sealed since 1960 under pool
194	102.1		232632				3"	n/a	n/a	C	Connected 06/03/94
195	102.1		232633							B	Card 06/03/94
196	102.1		232634							N/L	Not located 06/03/94
197			232635							?	No such address 06/15/94
198			232636							B	Card 06/15/94
199			232637				4"	n/a	n/a	C	Connected 06/16/94

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
200			232638				2"	n/a	n/a	C	Connected 06/03/94
201	10.2.1		232640				n/a	n/a	n/a	S	Sealed
202	10.2.1		232641				2"	30'	65'	S	Sealed 06/27/88
203	10.2.1		232642				2"	n/a	80'	S	Sealed 03/26/86
204	10.2.1		232643							A	Card 05/18/94
205			232644				4"	36'	82'	S	Sealed 08/30/89
206	10.2.1		232645							A	Card 06/14/94
207			232648								N/W/O No well per manager 05/19/94
208			232649							?	No such address
209	10.2.1		232650							A	Card 05/27/94
210	10.2.1		232651							A	Card 06/14/94
211			232653				4"	n/a	n/a	C	Connected 06/14/94
212			232654							?	No such address 06/14/94
213	10.2.1		232656							A	Card 05/26/94
214	10.2.1		232657							?	M.H. in yard possible well 06/14/94
215			232658							A	Card 06/15/94
216	10.2.1		232660							B	Card 06/14/94
217	10.2.1		232661							N/L	Not located 06/14/94
218			232662				n/a	n/a	n/a	N/S	Not sealed 06/14/94
219	10.2.1		232663							B	Card 06/14/94
220			232665				n/a	n/a	n/a	C	Connected 05/13/94 rear steps lawn only
221			232668				3"	n/a	n/a	C	Connected not used 05/13/94

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
2	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
222			232669							A	Card left 05/13/94
223			232670							N/W/O	not located 12/08/87 Stodola Well Co.
224			232671							N/L	Not located 05/10/94
225			232672							N/L	Not Located 05/13/94
226			232673							N/W/O	No well per owner 05/13/94
227	10.2.1		232674				6"	n/a	n/a	C	Connected lawn use 05/13/94
228			232675							A	Card left 05/13/94
229	10.2.1		232677				2"	n/a	118'	S	Sealed 07/20/93
230			232679				4 1/2"	n/a	n/a	S	Sealed 08/03/1987
231	10.2.1		232680				n/a	n/a	n/a	N/S	Capped not properly sealed 05/27/94
232	10.2.1		232681							N/L	not located 05/12/94
233	10.2.1		232683							N/L	Not located 05/10/94
234	10.2.1		232684				2"	60'	71'	S	Sealed 06/23/92
235	10.2.1		232685							B	Card 06/14/94
236	10.2.1		232686				4"	36'	108'	S	Sealed 02/15/90
237	10.2.1		232688							B	Card 05/19/94, no answer 06/16/94
238			232689							A	Card 05/17/94
239			232690				3"	n/a	n/a	C	Connected not used 05/13/94
240			232691							A	Card 05/16/94
241			232692				2"	n/a	60'	N/S	Not sealed 06/16/94
242			232693				n/a	n/a	n/a	S	Sealed before 1988
243			232694				2"	45'	85'	S	Sealed 07/07/86

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
244	102.1		232695							B	Card 06/15/94
245			232696				2"	48'	92'	S	Sealed 12/01/89
246			232697				4"	36'	108'	S	Sealed 02/15/90
247			232698				2"	n/a	n/a	S	Sealed 08/26/86
248			232699				n/a	n/a	n/a	S/P/O	Sealed per owner before 1989
249			232700							?	Edina
250	102.1		232701							N/L	Not located 05/27/94
251	102.1		232702				4"	n/a	90'	C	Connected 05/13/94
252	102.1		232703				1.25"	n/a	24'	S	Sealed 03/01/93
253			232704							B	Card 05/16/94, no answer 06/16/94
254			232705				2"	20'	38'	S	Sealed 04/09/90
255			232706							?	Hopkins
256	102.1		232707							N/L	Not located 05/17/94
257			232708							?	Hopkins
258			232709							?	Hopkins
259			232710							?	Hopkins
260			232712				4"	20'	112'	S	Sealed 09/25/92
261			232713							?	Hopkins
262			232714							?	Hopkins
263			232715							?	Hopkins
264			232717							?	Hopkins
265			232718							?	Hopkins

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
266			232719							?	Hopkins
267			232720							?	Hopkins
268			232721							?	Hopkins
269			232723							?	Hopkins
270			232724							?	No such address 05/31/94
271			232725							?	Hopkins
272			232737				4"	20'	86'	S	Sealed 8/13/92
273			232738				9"	n/a	80'	C	Connected 05/17/94
274	10.2.1		232741							A	Card 05/27/94
275	10.2.1		232742				4"	50'	72'	S	Sealed 01/23/91
276	10.2.1		232744				n/a	n/a	n/a	S/P/O	Sealed 05/31/94 under driveway
277	10.2.1		232745				n/a	n/a	n/a	S	Sealed 05/27/94
278	10.2.1		232746							S/P/O	Sealed per owner 05/16/94
279	10.2.1		232747				2"	n/a	n/a	S	Sealed 09/16/86
280	10.2.1		232748							S/P/O	Sealed per owner
281	10.2.1		232749				2"	n/a	n/a	N/S	* Not Sealed Properly 05/16/94
282	10.2.1		232750							N/W/O	Not located per owner 05/23/94
283	10.2.1		232751							A	Card 05/16/94
284	10.2.1		232752							N/W/O	No well per owner 06/15/94
285	10.2.1		232753				2"	n/a	n/a	C	Connected 06/02/94
286	10.2.1		232755				2"	n/a	80'	n/s	8/26/1994
287	10.2.1		232757							S/P/O	Sealed per owner

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
288	10.2.1		232759				n/a	n/a	n/a	S/P/O	Sealed per owner
289	10.2.1		232760				1 1/4"	n/a	22'	S	Sealed 03/18/88
290	10.2.1		232761							?	No such address 05/27/94
291	10.2.1		232762				2"	50'	75'	S	Sealed 09/10/93
292			232763							A	Card left 05/13/94
293	10.2.1		232764							N/W/O	Not located 05/31/94 per inspections
294	10.2.1		232766							?	No such address
295	10.2.1		232767				2"	n/a	70'	S	Sealed 02/10/89
296	10.2.1		232769				4"	n/a	n/a	C	Connected 06/15/94
297	10.2.1		232770				3"	n/a	n/a	N/S	Capped Not sealed 06/03/94
298	10.2.1		232771							B	Card 05/26/94
299	10.2.1		232772				2"	105'	115'	S	Sealed 11/20/90
300	10.2.1		232773							N/L	Same as 5719 Goodrich
301	10.2.1		232774							N/W/O	No Well per owner 05/18/94
302	10.2.1		232775							A	Card 06/03/94
303	10.2.1		232776							A	Card 06/03/94
304	10.2.1		232777							A	Card 06/03/94
305	10.2.1		232778				n/a	n/a	n/a	S	Sealed 06/02/94
306	10.2.1		232779							A	Card 05/31/94
307	10.2.1		232780				n/a	n/a	n/a	*	Unsure if sealed 05/17/94 debris in pit
308	10.2.1		232781				n/a	n/a	n/a	O	Open 05/27/94
309	10.2.1		232782							B	Card 05/16/94

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
2	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
310	10.2.1		232783				1 1/4"	n/a	21'	S	Sealed 05/24/90
311	10.2.1		232784				2"	n/a	60'	S	Sealed 02/26/88
312	10.2.1		232786							A	Card 05/31/94
313	10.2.1		232787				n/a	n/a	n/a	S	Sealed 06/16/94
314	10.2.1		232788				2"	50'	75'	S	Sealed 06/20/91
315	10.2.1		232789							A	Card 05/27/94
316	10.2.1		232790				2"	45'	52'	S	Sealed 01/22/91
317	10.2.1		232791							A	Card 05/26/94
318			232792				n/a	n/a	n/a	S	Sealed 05/18/94
319	10.2.1		232793							N/W/O No well per owner 05/26/94	
320	10.2.1		232794							A	Card 05/27/94
321	10.2.1		232795				3"	50'	180'	S	Sealed 06/00/42
322	10.2.1		232796				n/a	n/a	n/a	S/P/O	Sealed per owner 05/19/94
323	10.2.1		232797				n/a	n/a	n/a	S/P/O	Sealed per owner 05/23/94
324	10.2.1		232798							B	Card 05/17/94
325	10.2.1		232799				4"	n/a	n/a	S	Sealed 05/19/94
326	10.2.1		232800							S/P/O	Sealed per owner 05/16/94
327			232801							A	Card 05/27/94
328	10.2.1		232803							A	Card 05/26/94
329	10.2.1		232804				2"	35'	60'	S	Sealed 03/15/88
330	10.2.1		232805							B	Card 06/02/94
331			232806				n/a	n/a	n/a	C	Connected 05/27/94

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
2	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
332			232807							A	Card 05/13/94
333	10.2.1		232808				n/a	n/a	n/a	S	Sealed 05/31/94
334	10.2.1		232810				n/a	n/a	n/a	S	Sealed 05/19/94
335	10.2.1		232811							A	Card 06/02/94
336			232812							A	Card 05/26/94
337			232813							B	Card 05/27/94
338	10.2.1		232814				4"	n/a	n/a	C	Connected 06/03/94
339	10.2.1		232815				n/a	n/a	n/a	S	Sealed 06/03/94
340			232816				3"	n/a	n/a	N/S	Not sealed properly 05/18/94
341	10.2.1		232817							N/W/O	No well per owner 05/13/94
342	10.2.1		232818				4"	n/a	60'	C	Connected 06/15/94
343	10.2.1		232819							B	Card 06/14/94
344			232820							B	Card left 05/13/94
345	10.2.1		232821							B	Card 05/26/94
346	10.2.1		232823							B	Card 05/27/94
347			232824				2"	80'	100'	S	Sealed 09/16/88
348	10.2.1		232825							N/L	Not located 05/31/94
349	10.2.1		232826							B	Card 06/14/94
350	10.2.1		232827				2"	n/a	70'	S	Sealed 05/03/88
351	10.2.1		232828				3"	80'	120'	S	Sealed 09/18/89
352			232829							A	Card 06/03/94
353	10.2.1		232831				2"	n/a	n/a	*	Not sealed 05/31/94 owner puts stuff in it

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
2	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static Depth	Status	Comments	
354			232832				2"	n/a	n/a	A	Card 06/15/94
355			232833				2"	n/a	n/a	N/S	Capped 05/31/94 not sealed
356			232834							A	Card left 05/13/94
357			232836				3"	n/a	n/a	C	Connected lawn use 05/13/94
358	10.2.1		232837				4"	27'	110'	S	Sealed 09/30/90
359			232838							N/L	not located 01/30/92 per State Health Dept
360	10.2.1		232839				2"	50'	100'	S	Sealed 08/02/90
361	10.2.1		232841							N/W/O	No well per owner 05/16/94
362	10.2.1		232842				n/a	n/a	n/a	C	Connected 06/16/94 not using
363	10.2.1		232843				2"	n/a	n/a	C	Connected 06/14/94 not used
364	10.2.1		232844							B	Card 05/26/94
365	10.2.1		232845				2"	n/a	90'	S	Sealed 05/05/88
366	10.2.1		232846				4"	n/a	210'	C	Connected 05/18/94
367	10.2.1		232847				n/a	n/a	n/a	S	Sealed 05/27/94
368	10.2.1		232848				2"	n/a	n/a	N/S	Not sealed properly 05/10/94
369	10.2.1		232849							B	Card 05/27/94
370	10.2.1		232850							A	Card 05/18/94
371	10.2.1		232851				2"	55'	80'	S	Sealed 09/26/90
372	10.2.1		232852								100
373	10.2.1		232855								156
374	10.2.1		232856								
375	10.2.1		232859								

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K	
2	RAP Proj#			Unique#	Number	Street	Name	Diameter		Static Depth	Status	Comments
376	102.1		232861								106	
377	102.1		232862									
378	102.1		232864								86	
379	102.1		232865									
380	102.1		232866									
381	102.1		232867									
382	102.1		232868									
383	102.1		232869									
384	102.1		232870									
385	102.1		232871									
386	102.1		232873									
387	102.1		232874									
388	102.1		232875								80	
389	102.1		232877								100	
390	102.1		232878									
391	102.1		232880								100	
392	102.1		232881									
393	102.1		232882									
394	102.1		232883									
395	102.1		232885									
396	102.1		232889									
397	102.1		232890									

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
2	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
398	102.1		232892								
399	102.1		232893								
400	102.1		232894								
401	102.1		232895								
402	102.1		232896								
403	102.1		232900								
404	102.1		232901								
405	102.1		232902						84		
406	102.1		232903								
407	102.1		232904								
408	102.1		232905								
409	102.1		232906								
410	102.1		232908								
411	102.1		232910								
412	102.1		232911								
413	102.1		232912								
414	102.1		232914								
415	102.1		232915								
416	102.1		232916								
417	102.1		232917								
418	102.1		232918								
419	102.1		232919								

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static Depth	Status	Comments	
420	10.2.1		232920								
421	10.2.1		232921								
422	10.2.1		232922								
423	10.2.1		232923								
424	10.2.1		232924								
425	10.2.1		232926								
426	10.2.1		232927								
427	10.2.1		232932								
428	10.2.1		232933								
429	10.2.1		232934					80			
430	10.2.1		232935								
431	10.2.1		232936								
432	10.2.1		232937								
433	10.2.1		232938					140			
434	10.2.1		232940								
435	10.2.1		232946					170			
436	10.2.1		232947					150			
437	10.2.1		232948					175			
438	10.2.1		232949					100			
439	10.2.1		232950								
440	10.2.1		232951								
441	10.2.1		232952								

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
2	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
442	102.1		232956						80		
443	102.1		232961						80		
444	102.1		232962						80		
445	102.1		232964						75		
446	102.1		232971						75		
447	102.1		232972						75		
448	102.1		232977						75		
449	102.1		232981						75		
450	102.1		232982						75		
451	102.1		232988						75		
452	102.1		232992						75		
453	102.1		233308						75		
454	102.1		233309						75		
455	102.1		233311						75		
456	102.1		233312						75		
457	102.1		233313						75		
458	102.1		233314						75		
459	102.1		233317						75		
460	102.1		233318						75		
461	102.1		233319						75		
462	102.1		233320						75		
463	102.1		233321						75		

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
2	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
464	10.2.1		233323								
465	10.2.1		233324								
466	10.2.1		233325								
467	10.2.1		233326								
468	10.2.1		233328								
469	10.2.1		233329								
470	10.2.1		233331								
471	10.2.1		233332								
472	10.2.1		233334								
473	10.2.1		233335								
474	10.2.1		233336								
475	10.2.1		233337								
476	10.2.1		233338								
477	10.2.1		233339								
478	10.2.1		233340								
479	10.2.1		233341								
480	10.2.1		233342								
481	10.2.1		233344								
482	10.2.1		233345								
483	10.2.1		233346								
484	10.2.1		233347								
485	10.2.1		233348								

WELL DATA

	A	B	C	D	E	F	G	H	I	J	K
	RAP	Proj#	Unique#	Number	Street	Name	Diameter	Static	Depth	Status	Comments
486	10.2.1		233349								
487	10.2.1		233351								
488	10.2.1		233352								
489	10.2.1		233353								
490	10.2.1		233354								
491	10.2.1		233355								
492	10.2.1		233356								
493	10.2.1		233357								
494	10.2.1		233358								
495	10.2.1		233359								
496	10.2.1		233360								
497	10.2.1		233362								
498	10.2.1		233364								
499	10.2.1		233365								
500	10.2.1		233773								

FEATURE_ID	TYPE_CODE	TYPE_DESC	FAC_NAME	ADDRESS	X_COORD	Y_COORD	Risk	EMZ WELL #	Counts	SUMMARY
52320	AGUNK	Agricultural site unknown	Minneapolis Golf Club	2001 Flag Ave S	468765.09	4978928.5	high	8 & 16	1	
33962	LUST	Leaking underground storage tank	Equitable Life Ass. Society-south Bld	600 Hwy 169	468403.9186	4980075.931	high	8 & 16	1	2 Registered storage tank
33963	LUST	Leaking underground storage tank	Equitable Life Ass. Society-tower Bld	600 S Hwy 169	468403.9186	4980075.931	high	8 & 16	1	6 Leaking underground storage tank
33972	LUST	Leaking underground storage tank	Interchange Tower	600 Hwy 169	468403.9186	4980075.931	high	8 & 16	1	1 Agricultural site unknown
34233	LUST	Leaking underground storage tank	Interchange Tower	600 S Hwy 169	468403.9186	4980075.931	high	8 & 16	1	
33965	LUST	Leaking underground storage tank	Interchange Tower North	600 South Hwy 169	468403.9186	4980075.931	high	8 & 16	1	
34307	LUST	Leaking underground storage tank	Minneapolis Golf Club	2001 Flag Ave S	468752.7013	4978928.131	high	8 & 16	1	
12060	RST	Registered storage tank	Minneapolis Golf Club	2001 Flag Ave S	468764.2304	4978867.371	high	8 & 16	1	
20858	RST	Registered storage tank	Water Treatment Plant #16	2012 Flag Ave	468722.977	4978902.962	high	8 & 16	1	
									9	
54321	AGUNK	Agricultural site unknown	Scottslandscape Services	1817 Dakota Ave S	471560.28	4979175.5	high	13 & 14	1	
53699	AGUNK	Agricultural site unknown	Suburban Ground Maintenance	5821 Cedar Lake Rd	471897.47	4979156	high	13 & 14	1	1 Voluntary investigative clean-up
34624	LUST	Leaking underground storage tank	Bury & Carlson Inc	6008 Wayzata Blvd	471871.9139	4979735.013	high	13 & 14	1	9 Registered storage tank
34264	LUST	Leaking underground storage tank	Coynes Giftware/MNDOT	5900 Wayzata Blvd	472003.3877	4979732.966	high	13 & 14	1	1 Toxic release site
34363	LUST	Leaking underground storage tank	Former Bury Carlson Site	6008 Wayzata Blvd	471871.9139	4979735.013	high	13 & 14	1	2 Agricultural site unknown
34563	LUST	Leaking underground storage tank	Golden Hills Business Park Dvlp II&III	6030 Wayzata Blvd	471848.2042	4979738.19	high	13 & 14	1	6 Leaking underground storage tank
34288	LUST	Leaking underground storage tank	MNDOT/I-394/walvac	5910 Wayzata Blvd	471992.746	4979732.984	high	13 & 14	1	
35584	LUST	Leaking underground storage tank	Treaures Island	5740 Wayzata Blvd	472173.6553	4979732.667	high	13 & 14	1	
2897	RST	Registered storage tank	Bury & Carlson Inc	6008 Wayzata Blvd	471874.2218	4979752.239	high	13 & 14	1	
17188	RST	Registered storage tank	C & L Management	6009 Wayzata Blvd	471870.4753	4979702.294	high	13 & 14	1	
11934	RST	Registered storage tank	Former - Furniture & Giftware Store	5900 Wayzata Blvd	472003.4182	4979750.346	high	13 & 14	1	
2140	RST	Registered storage tank	Honeywell Inc	1625 Zarthan Ave	471993.4716	4979265.816	high	13 & 14	1	
2450	RST	Registered storage tank	Monarch Food Service	5901 Wayzata Blvd	472003.3305	4979700.346	high	13 & 14	1	
20640	RST	Registered storage tank	Park Place Office Center	5775 Wayzata Blvd	472137.4163	4979700.111	high	13 & 14	1	
12983	RST	Registered storage tank	Sp 2789-17/Parcel 26	6001 Wayzata Blvd	471876.2038	4979701.527	high	13 & 14	1	
12984	RST	Registered storage tank	Sp 2789-17/Parcel 37G	5910 Wayzata Blvd	471992.7764	4979750.364	high	13 & 14	1	
1638	RST	Registered storage tank	Westside Office Park	6005 Wayzata Blvd	471873.3396	4979701.911	high	13 & 14	1	
41261	VIC	Voluntary investigative clean-up	Honeywell, Inc	1625 Zarthan Avenue	471973.8438	4979274.5	high	13 & 14	1	
									18	
56569	AGSEED	Agricultural seed storage site			471368.06	4977525	high	3, 10, 11, 15	1	
35732	LUST	Leaking underground storage tank	Lenox Community Center	6715 Minnetonka Blvd	471232.5813	4977385.887	high	3, 10, 11, 15	1	2 Leaking underground storage tank
34710	LUST	Leaking underground storage tank	Saint Louis Park Service Center	7119 Minnetonka Blvd	470823.3377	4977385.83	high	3, 10, 11, 15	1	1 Agricultural seed storage site
2526	RST	Registered storage tank	Lenox Community Center	6715 Minnetonka Blvd	471234.5009	4977381.186	high	3, 10, 11, 15	1	2 Registered storage tank
2371	RST	Registered storage tank	Saint Louis Park Mobil Service Center	7119 Minnetonka Blvd	470819.888	4977371.955	high	3, 10, 11, 15	1	1 Voluntary investigative clean-up
41205	VIC	Voluntary investigative clean-up	Fina Unit 7523	6405 Minnetonka Blvd	471278.1875	4977375.5	high	3, 10, 11, 15	1	
									6	
55174	AGUNK	Agricultural site unknown	Leslies Swimming Pool Supply	4995 Excelsior Blvd	472860.13	4975439	high	4	1	
54914	AGUNK	Agricultural site unknown	Pets Unlimited	5301 Excelsior Blvd	472670.53	4975359	high	4	1	7 Registered storage tank
35469	LUST	Leaking underground storage tank	Amoco Ss #5272	4701 Excelsior Blvd	473180.5665	4975587.841	high	4	1	2 Voluntary investigative clean-up
34010	LUST	Leaking underground storage tank	City Of Robbinsdale Shop (1992)	4601 Toledo Ave N	472648.6724	4975123.757	high	4	1	2 Agricultural site unknown
26245	LUST	Leaking underground storage tank	Classic Motor Co	4700 Excelsior Blvd	473176.0743	4975602.679	high	4	1	9 Leaking underground storage tank
35339	LUST	Leaking underground storage tank	Formerly Wilkins Pontiac	5100 Excelsior Blvd	472787.2364	4975438.082	high	4	1	
34068	LUST	Leaking underground storage tank	Park Nicollet Medical	5000 W 39th St	472893.3233	4975574.879	high	4	1	
35672	LUST	Leaking underground storage tank	Park Nicollet Vacant Facility	4951 Excelsior Blvd	472886.515	4975463.499	high	4	1	
34145	LUST	Leaking underground storage tank	Sathers Inc	7900 Excelsior Blvd	472849.4666	4975464.385	high	4	1	
35733	LUST	Leaking underground storage tank	Susan Lindgren Elementary School	4801 W 41st St	473102.424	4975111.499	high	4	1	
35125	LUST	Leaking underground storage tank	Wilkins Pontiac	5100 Excelsior Blvd	472787.2364	4975438.082	high	4	1	
1944	RST	Registered storage tank	Amoco SS #5272	4701 Excelsior Blvd	473269.1184	4975616.074	high	4	1	
9873	RST	Registered storage tank	Miracle Mile Shopping Center	5009 Excelsior Blvd - Suite 118	472859.5141	4975433.641	high	4	1	
1556	RST	Registered storage tank	Parking Lot	5000 Excelsior Blvd	472848.7812	4975472.547	high	4	1	
2457	RST	Registered storage tank	Susan Lindgren Elementary School	4801 W 41st St	473103.3958	4975096.911	high	4	1	
13338	RST	Registered storage tank	Tower Place	5264 Excelsior Blvd	472685.6817	4975403.075	high	4	1	
16470	RST	Registered storage tank	Westmoreland Hills Condominium	4530 W 38th St	473342.5378	4975781.553	high	4	1	
2973	RST	Registered storage tank	Wilkins Pontiac	5100 Excelsior Blvd	472787.0011	4975446.232	high	4	1	
41562	VIC	Voluntary investigative clean-up	Park Nicollet	5000 West 39th Street	472772.0157	4975573.815	high	4	1	
41565	VIC	Voluntary investigative clean-up	Wilkins Pontiac	5100 Excelsior Blvd.	472689.3341	4975451.381	high	4	1	
									20	

NOTHING 6 & 12

FEATURE_ID	TYPE_CODE	TYPE_DESC	FAC_NAME	ADDRESS	X_COORD	Y_COORD	Risk	EMZ WELL #	Counts		SUMMARY
?	?	Golf Course	?	?	468,924	4,978,828	medium	8 & 16	1		
66648	GPIT	Gravel pit			468,214	4,980,038	medium	8 & 16	1	6	Hazardous waste generator
66649	GPIT	Gravel pit			468,209	4,979,638	medium	8 & 16	1	2	Gravel pit
79808	HWG	Hazardous waste generator	Agfa Division Of Bayer Inc	9970 Wayzata Blvd	467,942	4,980,145	medium	8 & 16	1		
72401	HWG	Hazardous waste generator	Earls Auto Palace	1300 Ford Rd	468,011	4,979,786	medium	8 & 16	1		
94897	HWG	Hazardous waste generator	Interchange Tower Grubb And Ellis	600 S Hwy 169 Ste 1585	468,410	4,980,072	medium	8 & 16	1		
95263	HWG	Hazardous waste generator	Petrosky And Petrosky	10613 Crestridge Dr	467,443	4,979,629	medium	8 & 16	1		
79859	HWG	Hazardous waste generator	Ridgedale Chiropractic	9950 Wayzata Blvd Ste A	467,952	4,980,143	medium	8 & 16	1		
72388	HWG	Hazardous waste generator	Tesar Engineering	10409 Belmont Rd	467,611	4,979,442	medium	8 & 16	1		
									9		
94489	HWG	Hazardous waste generator	Alliant Techsystems Inc	1625 Zarthan Ave	471975.1797	4979270.915	medium	13 & 14	1	17	Hazardous waste generator
94520	HWG	Hazardous waste generator	Breck School Ice Center	5800 Wayzata Blvd	472116.7564	4979726.874	medium	13 & 14	1		
78950	HWG	Hazardous waste generator	Bury Carlson Inc Former	6008 Wayzata Blvd	471806.9059	4979804.986	medium	13 & 14	1		
78878	HWG	Hazardous waste generator	Center For Diagnostic Imaging	5775 Wayzata Blvd Ste 190	472012.9758	4979669.012	medium	13 & 14	1		
78837	HWG	Hazardous waste generator	Coin Controlled Washers Inc	6012 Wayzata Blvd	471803.6766	4979804.896	medium	13 & 14	1		
94619	HWG	Hazardous waste generator	Costco Wholesale 377	5801 W 16Th St	472081.3658	4979387.096	medium	13 & 14	1		
78838	HWG	Hazardous waste generator	Federal Bureau Of Investigatio	6009 Wayzata Blvd	471847.0787	4979685.622	medium	13 & 14	1		
78880	HWG	Hazardous waste generator	Golden Wrench Auto Service Inc	1341 Colorado Ave S	471668.6866	4979671.839	medium	13 & 14	1		
78918	HWG	Hazardous waste generator	Holzer Imported Cars Inc	6011 Wayzata Blvd	471845.8724	4979685.772	medium	13 & 14	1		
78902	HWG	Hazardous waste generator	Home Depot The 2806	5800 Cedar Lake Road	472072.4615	4979135.208	medium	13 & 14	1		
94823	HWG	Hazardous waste generator	Honeywell	1625 Zarthan Ave S	471975.1797	4979270.915	medium	13 & 14	1		
78839	HWG	Hazardous waste generator	Northwest Racquet And Swim Clu	5525 Cedar Lake Road	472269.5127	4978935.853	medium	13 & 14	1		
78920	HWG	Hazardous waste generator	Osm And Associates	5775 Wayzata Blvd Ste 300	472012.9758	4979669.012	medium	13 & 14	1		
78903	HWG	Hazardous waste generator	Passig Chiropractic Pa	5811 Cedar Lake Rd	472055.0373	4979129.79	medium	13 & 14	1		
78833	HWG	Hazardous waste generator	Round 2 Recycling Ez Storage	5605 S Cedar Lake Road	472208.5682	4978984.047	medium	13 & 14	1		
78948	HWG	Hazardous waste generator	Rycoff Sexton Inc Twin Cities	5901 Wayzata Blvd	471912.2153	4979677.515	medium	13 & 14	1		
70926	HWG	Hazardous waste generator	Wwtc Radio Station	2306 Brunswick Ave	471626.9847	4979057.315	medium	13 & 14	1		
23450	TRS	Toxic release site	Honeywell	1625 Zarthan Ave S	471975.1797	4979270.915	medium	13 & 14	1	18	
66627	GPIT	Gravel pit	Schutt Realty Co		470943	4978014	medium	3, 10, 11, 15	1	5	Hazardous waste generator
79794	HWG	Hazardous waste generator	Bicycle Works The	7210 Minnetonka Blvd	470735.4655	4977416.554	medium	3, 10, 11, 15	1	1	Gravel pit
79848	HWG	Hazardous waste generator	Blvd Chiropractic Clinic Pa	7200 Minnetonka Blvd	470745.0373	4977416.643	medium	3, 10, 11, 15	1		
100367	HWG	Hazardous waste generator	Lenox Community Center	6715 Minnetonka Blvd	471236.4505	4977376.177	medium	3, 10, 11, 15	1		
79849	HWG	Hazardous waste generator	Oak Knoll Animal Hospital	7202 Minnetonka Blvd	470743.1229	4977416.625	medium	3, 10, 11, 15	1		
79778	HWG	Hazardous waste generator	St Louis Park Service Center	7119 Minnetonka Blvd	470828.8813	4977402.138	medium	3, 10, 11, 15	1	6	
78831	HWG	Hazardous waste generator	Brown Steven Dr Dental Office	5009 Excelsior Blvd	472837.7484	4975439.542	medium	4	1	13	Hazardous waste generator
78935	HWG	Hazardous waste generator	German Auto Works	4825 Excelsior Blvd	473054.8369	4975528.638	medium	4	1		
78832	HWG	Hazardous waste generator	Gross Susan G Dds	5009 Excelsior Blvd Ste 124	472837.7484	4975439.542	medium	4	1		
94963	HWG	Hazardous waste generator	Lindgren Susan Intermediate School	4801 W 41St St	473084.6914	4975107.007	medium	4	1		
95087	HWG	Hazardous waste generator	Mail Boxes Etc	5115 Excelsior Blvd	472771.9379	4975421.594	medium	4	1		
70928	HWG	Hazardous waste generator			472685.6242	4975303.216	medium	4	1		
78830	HWG	Hazardous waste generator	Park Nicollet Medical Center C	4951 Excelsior Blvd	472882.7132	4975457.957	medium	4	1		
78936	HWG	Hazardous waste generator	Park True Value Hardware	5025 Excelsior Blvd	472825.3443	4975434.462	medium	4	1		
78829	HWG	Hazardous waste generator	Russells Amoco	4701 Excelsior Blvd	473181.5167	4975584.191	medium	4	1		
95380	HWG	Hazardous waste generator	S And D Dry Cleaners Inc	4501 Excelsior Blvd	473404.4136	4975704.44	medium	4	1		
95473	HWG	Hazardous waste generator	Typemasters Inc	4524 Excelsior Blvd	473379.9152	4975695.654	medium	4	1		
78955	HWG	Hazardous waste generator	Wilkins Pontiac Site	5100 Excelsior Blvd	472763.9371	4975447.901	medium	4	1		
78851	HWG	Hazardous waste generator	Zip Printing	4950 Excelsior Blvd	472875.445	4975494.932	medium	4	1	13	
						NOTHING		6 & 12			

FEATURE_ID	TYPE_CODE	TYPE_DESC	FAC_NAME	ADDRESS	X_COORD	Y_COORD	Risk	EMZ WELL #	Counts	SUMMARY
127912	HTL	Hotel/Motel	Dillon Inns	10420 Wayzata Blvd	467582.7	4980030	low	8 & 16	1	2 Hotel/Motel
127904	HTL	Hotel/Motel	Holiday Inn Minneapolis West	9970 Wayzata Blvd	468163.3	4980071	low	8 & 16	1	
									2	
45061	ARP	Air release point	Bury And Carlson Inc	6008 Wayzata Blvd	471862.2	4979730	low	13 & 14	1	2 Air release point
45130	ARP	Air release point	Honeywell	1625 Zarthan Ave S	471975.7	4979271	low	13 & 14	1	
127897	HTL	Hotel/Motel	Sheraton Park Place Hotel	1500 Park Place Blvd	472226.9	4979694	low	13 & 14	1	
129606	HTL	Hotel/Motel	Super 8 Golden Valley	6300 Wayzata Blvd	471791.9	4979793	low	13 & 14	1	4
									4	
47398	SCH	School	Lenox School		471254.6	4977333	low	3, 10, 11, 15	1	1 School
62660	PRK	Park	Bronx Park		470992.6	4977550	low	3, 10, 11, 15	1	1 Park
									2	
63276	PRK	Park	Minikahda Vista Park		473766.7	4975378	low	4	1	3 Park
63738	PRK	Park	Weber Field		473830.9	4975008	low	4	1	1 Restaurant
63792	PRK	Park	Yale Gardens Park		472713.3	4975105	low	4	1	2 School
109384	REST	Restaurant	McDonald's	5200 Excelsior Blvd	472725.3	4975405	low	4	1	
46930	SCH	School	Calvin School		473743.9	4975163	low	4	1	
47543	SCH	School	Morningside School		473720.9	4974916	low	4	1	6
									6	
62663	PRK	Park	Brookside Park		471965.5	4974522	low	6 & 12	1	1 Park
									1	

HIGH

TYPE_DESC	COUNT
Agricultural chemical storage site	12
Agricultural feed storage site	6
Agricultural seed storage site	3
Agricultural site unknown	58
Dump	11
Federal Superfund site	1
Leaking underground storage tank	300
No further remedial action planned	2
Registered storage tank	326
State Superfund site	2
Suspected hazardous waste site	2
Voluntary investigative clean-up	56

MEDIUM

TYPE_DESC	COUNT
Golf course	1
Gravel pit	21
Hazardous waste generator	642
National discharge site	9
Toxic release site	21

LOW

TYPE_DESC	COUNT
Air release point	15
Bridge	26
Church	3
Gage station	5
Garden	1
Historical site	7
Hospital	2
Hotel/Motel	8
Museum	2
Nature reserve	1
Park	32
Resource management plan	1
Restaurant	10
School	30
Seaplane landing area	2
Theatre	1
Tower	4

Appendix C

Source Water Assessment

SOURCE WATER ASSESSMENT FOR Saint Louis Park

ID Number: 1270050

Facility Contact: Scott E. Anderson
(952) 924-2557
Saint Louis Park
5005 Minnetonka Boulevard
St. Louis Park, MN 55416

MDH Contact: Terry Bovee
(507) 389-6597
Nichols Office Center
410 Jackson Street, Suite 500
Mankato, MN 56001-3752
terry.bovee@health.state.mn.us

Status of the Source Water Protection Plan:

The water supply system is preparing a protection plan for the wellhead protection area(s) that have been approved by the Minnesota Department of Health under provisions of Minnesota Rules Chapter 4720.

Source Water Protection Area: - Click [Map1](#) to view SWPA map(s).

Yes - A Source Water Protection Area has been designated for this well.

Description of the source water - The water supply for Saint Louis Park is obtained from 11 primary wells. Well depth (in feet), well status, aquifer(s) used, and sensitivity of the source(s) of drinking water are listed in the following table.

Unique Well No	Well ID	Depth	Well Use	Aquifer	Aquifer Sensitivity	*Well Sensitivity	SWPA
00203678	Well #8	507.0	Primary	Bedrock	High	See (2)	Yes
00206442	Well #10	500.0	Primary	Bedrock	High	See (2)	Yes
00206439	Well #11	1093.0	Primary	Bedrock	High	See (2)	Yes
00227965	Well #14	485.0	Primary	Bedrock	High	See (2)	Yes
00203187	Well #16	500.0	Primary	Bedrock	High	See (2)	Yes
00206456	Well #12	1095.0	Primary	Bedrock	High	See (2)	Yes
00206424	Well #13	1045.0	Primary	Bedrock	High	See (2)	Yes
00215447	Well #15	503.0	Primary	Bedrock	High	See (2)	Yes
00200542	Well #4	503.0	Primary	Bedrock	High	See (2)	Yes
00206457	Well #6	482.0	Primary	Bedrock	High	See (2)	Yes
00206440	Well #3	286.0	Primary	Bedrock	High	See (2)	Yes

Well construction assessment - The water wells used by the Saint Louis Park meet current standards for construction and maintenance. These factors do not contribute to the susceptibility of the source

water to contamination.

Well Sensitivity - Well sensitivity refers to the integrity of the well due to its construction and maintenance. It is based on the results of the well construction assessment. It can be one of the following:

- (1) The well is susceptible to contamination because it does not meet current construction standards or no information about well construction is available, regardless of aquifer sensitivity.
- (2) The well is not susceptible because it meets well construction standards and does not present a pathway for contamination to readily enter the water supply.

Aquifer Sensitivity - Aquifer sensitivity refers to the degree of geological protection afforded the aquifer(s) used by the public water supply.

High - The aquifer is considered to exhibit a high sensitivity to contamination because of the local geological setting.

Source Water Susceptibility - Source water susceptibility refers to the likelihood that a contaminant will reach the source of drinking water. It reflects the results of assessing well sensitivity, aquifer sensitivity, and water quality data.

High - The source of drinking water is considered to exhibit a high susceptibility to contamination because of the local geological setting.

High - The source water is considered to be susceptible because of the tritium content of the well water in bedrock.

This community public water system has exceeded the Radium Maximum Contaminant Level (MCL) of 5 pCi/L. Radium is a naturally-occurring contaminant and is found in southern and central Minnesota.

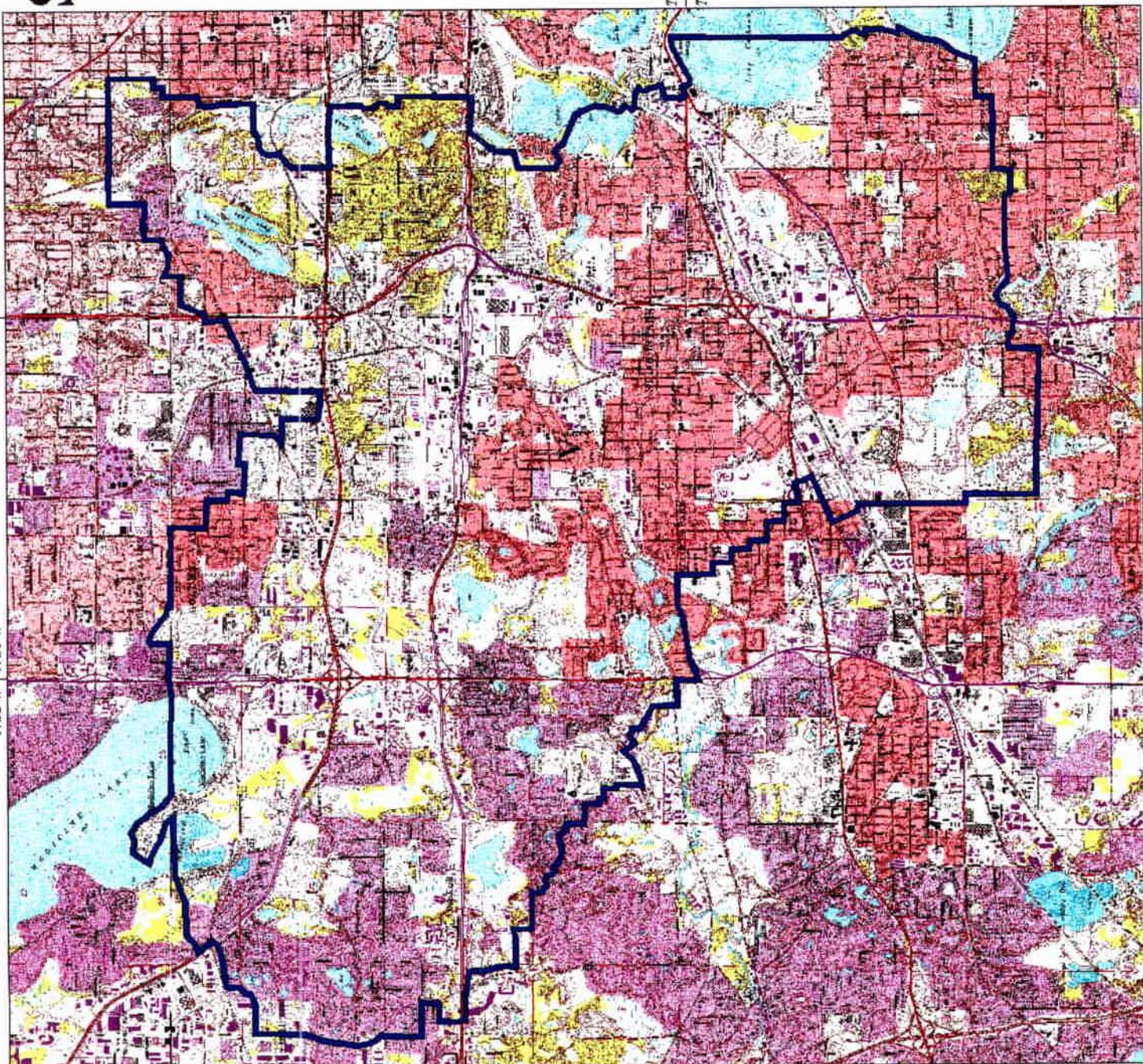
Contaminants of concern - The following statement summarizes the potential contaminants for which a source of drinking water may be at risk:

One or more contaminants regulated under the federal Safe Drinking Water Act for this public water supply system have been detected in the source water. However, the water supplied to users meets state and federal drinking water standards for potability. For further information, please contact the MDH representative listed at the beginning of this assessment.

Saint Louis Park

*Drinking Water Supply
Management Area
(DWSMA) MN-00274
10 year Time of Travel*

 DWSMA Boundary



V = Variable Vulnerability



Approved April 12, 2004

Appendix D

2004 Water Quality Report

Water Quality Report

Federal law requires all U.S. water utilities to publish an annual report on its drinking water quality. The City of St. Louis Park's Water Utility Division welcomes this opportunity to tell you about the water it delivers to you each day.

Water Monitoring Results

Test results for 2004 indicate that St. Louis Park's water meets or exceeds all federal drinking water standards.

All community drinking water systems in the United States are tested for regulated and unregulated substances. In order to ensure safe drinking water, the Environmental Protection Agency (EPA) requires public water suppliers to limit—but not eliminate—certain substances in their water.

According to the EPA, tap and bottled water may reasonably be expected to contain trace amounts of some substances because their presence does not necessarily indicate a health risk. Removing all substances from drinking water would not provide additional protection to public health. In fact, removing all substances from drinking water would result in an inferior product. Many naturally occurring minerals are essential nutrients that actually improve the taste of drinking water. St. Louis Park's municipal water supply is frequently tested to ensure drinking water quality. Substances found in trace amounts are listed on the charts on pages 4 and 5. To obtain the entire source water assessment, call the Minnesota Department of Health at 651/215-0800 (press 5) during business hours. Or, visit their web site at www.health.state.mn.us/divs/eh/water/swp/swa.

Source of St. Louis Park's Water

St. Louis Park's drinking water comes from groundwater sources. Fifteen wells ranging from 286 to 1095 feet deep draw water from the Prairie Du Chien-Jordan, Mt. Simon, Jordan-St. Lawrence and St. Peter aquifers.

Water is stored and delivered to you via a system that includes 140 miles of watermain, six treatment plants, three water towers and four reservoirs. Each year, the St. Louis Park water utility pumps, treats and delivers more than two billion gallons of water to St. Louis Park homes and businesses.

How Your Water Is Treated

Before delivering water to you, St. Louis Park's groundwater is treated by –

- Aerating and filtering it to remove iron and manganese. These two minerals can give water a rust-colored appearance; however, they pose no health hazard. In fact, these minerals are often found in vitamin supplements.
- Disinfecting it to eliminate microorganisms such as viruses and bacteria.
- Adding fluoride. The Minnesota Department of Health requires communities to add fluoride because fluoridated water has been proven to reduce the likelihood of tooth decay, especially in children.

In addition to the treatment listed above, three wells also utilize a granular activated carbon filtration system to remove organic contaminants.

Questions?

Call Utilities Superintendent Scott Anderson at 952/924-2557 if you have questions about the City of St. Louis Park's drinking water.

Regulated Substances In St. Louis Park Water

These tables show the substances that were detected in trace amounts last year or during the last testing. (When past test results have been very low, less frequent testing is required. Therefore, not all contaminants were sampled in 2004.)

Substance (units)	Goal (MCLG)	Highest Allowed (MCL)	Range Found*	Average Or Result *	Typical Source of Substance
Alpha Emitters (pCi/l)	0	15.4	not applicable	12.3	Erosion of natural deposits
Arsenic (ppb)	0	50	not applicable	2.4	Erosion of natural deposits or runoff from orchards, glass or electronics production
Barium (ppm)	2	2	not applicable	0.18	Erosion of natural deposits or discharge from metal refineries or drilling waste
Benzene (ppb)	0	5	0 – 0.3	0.08	Discharge from factories; leaching from gas storage tanks and landfills
Combined radium (pCi/l)	0	5.4	not applicable	3.8	Erosion of natural deposits
Fluoride (ppm)	4	4	0.21 – 1.4	1.1	Minnesota requires adding fluoride to promote strong teeth. Other sources are erosion of natural deposits or discharge from fertilizer or aluminum factories.
TTHM (total trihalomethanes) (ppb)	0	80	0 – 0.4	0.25	By-product of drinking water disinfection
Trichloroethylene (ppb)	0	5	0 – 1.3	0.33	Discharge from metal degreasing sites or other factories
Vinyl chloride (ppb)	0	2	0 – 1.5	1.4	Leaching from PVC piping; discharge from plastics factories
cis-1,2-Dichloroethylene (ppb)	70	70	0 – 1.5	0.38	Discharge from industrial chemical factories
Trans-1,2-Dichloroethylene	100	100	0 – 0.1	0.03	Discharge from industrial chemical factories

*This is the value used to determine compliance with federal standards. Sometimes, it is the highest value detected; sometimes, it is an average of all the detected values. If it is an average, it may contain sampling results from the previous year. Results are from 2004 or from the most recent test. (Some contaminants are not sampled each year.)

** Because of low levels, only one sample was required; therefore, no range is listed.

Unregulated Substances In St. Louis Park Water

Some substances do not have established Maximum Contaminant Levels. These “unregulated contaminants” are assessed using State standards known as health risk limits to determine if they pose a threat to human health. If unacceptable levels of an unregulated contaminant are found, the response is the same as if an MCL has been exceeded: the water system must inform its customers and take corrective action. Here are the unregulated substances that were detected. Because the levels have consistently been so low, sodium and sulfate are not tested annually. The results shown below are from 2002. Chlorine is added to water supplies throughout the country to control microbe growth. St. Louis Park checks chlorine levels every day; the city’s goal for chlorine levels is between 0.8 and 1.2.

Substance (units)	Health Risk Limit	Average Result	Source of Substance
Sodium (ppm)	None established	28	Erosion of natural deposits
Sulfate (ppm)	250 ppm	36	Erosion of natural deposits
Chlorine	4	0.98	Added to control microbe growth

Radon in St. Louis Park Water

Radon is a radioactive gas which is naturally occurring in some groundwater. Radon poses a lung cancer risk when gas is released from water into air during showering, bathing or washing dishes or clothes. Radon can pose a stomach cancer risk when it is ingested. Because radon in indoor air poses a much greater health risk than radon in drinking water, an Alternative Maximum Contaminant Level (AMCL) of 4,000 picoCuries per liter applies in states that have adopted an Indoor Air Program which compels citizens, schools and communities to reduce the radon threat from indoor air. Minnesota plans to adopt an Indoor Air Program once the Radon Rule is finalized. Currently, Minnesota uses a Maximum Contaminant Level (MCL) of 300 pCi/l. (Because radon levels have been well under the limit, yearly testing is not required. The results below are from 2001.)

Substance (units)	MCL	Average Result	Typical Source of Substance
Radon (pCi/l)	300	181	Erosion of natural deposits

Lead And Copper In Household Plumbing

St. Louis Park's tap water is in compliance with federal drinking water standards for lead. Lead does *not* come from the municipal water supply.

However, lead can leach into water if a home has lead pipes, lead service lines, brass plumbing fixtures, or copper pipes with lead solder. Brass fixtures remain on the market today so it's important to know that a recently purchased brass fixture that dispenses drinking water could leach lead into your otherwise safe drinking water. The simplest way to reduce possible lead exposure is to run your tap for 30 seconds to two minutes before using the water for cooking or drinking. By running your tap, you drain the water that has sat in your home's pipes and replace it with safe water from the municipal system. If you are concerned about lead, you may wish to have your home's water tested. For more information, call the Safe Drinking Water Hotline at 1-800-426-4791.

Approximately 60 homes in St. Louis Park have been identified as being at high risk for elevated lead levels due to the presence lead service lines or lead solder. Lead services lines have been replaced with copper lines. Every three years, a number of these homes are tested for lead in drinking water. During the most recent sampling in 2003, two of these homes exceeded the federal lead levels.

Substance (units)	Action Level	90% Levels	60 Homes Over Action Level	Typical Source of Substance
Lead (ppb)	15	7.0	2 out of 30	Corrosion of household plumbing or erosion of natural deposits
Copper (ppm)	1.3	0.48	0 out of 30	Corrosion of household plumbing or erosion of natural deposits

Key to abbreviations and terms –

MCLG-Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

MCL-Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Action Level: The concentration of a contaminant, which, if exceeded, triggers treatment, or other requirements, which a water system must follow.

90th Percentile Level – This is the value obtained after disregarding 10 percent of the samples taken that had the highest levels. (For example, in a situation in which 10 samples were taken, the 90th percentile level is determined by disregarding the highest result, which represents 10 percent of the samples.) Note: In situations in which only 5 samples are taken, the average of the two with the highest levels in taken to determine the 90th percentile level.

pCi/l—PicoCuries per liter (a measure of radioactivity)

ppb—Parts per billion, which can also be expressed as micrograms per liter (ug/l)

ppm—Parts per million, which can also be expressed as milligrams per liter (mg/l)

About Bottled Water

Under federal law, water bottlers are subject to less rigorous testing, treatment and public notification requirements than community water suppliers. In addition, bottled water does not contain fluoride which has been shown to help prevent tooth decay.

Bottled water is also more expensive than tap water. If you drink three 20-oz. bottles of water each day, it will cost you more than \$1,000 a year. The same amount of St. Louis Park tap water will cost you 17 cents for the year.

About Home Treatment Systems

Home water filtration systems have not been proven to improve the safety of municipally treated drinking water. If you opt to use a home water filtration system, be sure to maintain your filter. If filters are not frequently changed, they can become a breeding ground for bacteria. Because St. Louis Park's water contains higher levels of dissolved solids such as iron and calcium than some areas of the country, you may need to change your filter more often than the manufacturer recommends.

Some filtration systems also remove fluoride. If your children are drinking non-fluoridated water, you may wish to consult your dentist about cavity prevention.

Save Money – Sprinkle Lawns Wisely

Sprinkling your lawn wisely will save you money and help you avoid a fine. City ordinance prohibits the sprinkling of lawns from noon to 6 p.m. If you sprinkle during the hottest part of the day, as much as 75 percent of the water you pay for simply evaporates.

City ordinance also requires residents and businesses to follow an odd/even sprinkling schedule. (Homeowners with odd numbered addresses sprinkle on odd numbered calendar days; homeowners with even numbered addresses sprinkle on even numbered days. In other words, a home with an address number of 2653 can sprinkle on the 1st, 3rd, 5th, etc. A home with a 2654 address can sprinkle on the 2nd, 4th, 6th, etc.)

The fine for a first violation is \$25. After that, the fine rises by \$10 for each subsequent violation. (For example, the second violation is \$35, the third violation is \$45, etc.)

New sod or seed, and newly planted shrubs, trees and landscaping are exempt from the odd/even schedule. Flower and vegetable gardens are also exempt. However, sprinkling must be done before noon or after 6 p.m.

By following the ordinance, you will help the city avoid drawing down water reserves during hot weather. Low water pressure hampers firefighters' ability to fight a major fire.

A Message from the EPA about Drinking Water In The United States **Compliance With National Primary Drinking Water Regulations**

The sources of drinking water (both tap and bottled water) in the U.S. include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from human activity.

Contaminants that may be present in source water include:

Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic contaminant, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

Radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (EPA) prescribes regulations, which limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at 1-800-426-4791.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by cryptosporidium are available from the Safe Drinking Water Hotline at 1-800-426-4791.

Appendix E

Local Government Units

Local Government Units

Mr. Doran Cote
Public Works Director
City of Plymouth
3400 Plymouth Road
Plymouth, MN 55447

Mr. Joel Settles
Hennepin County Water Planner
471 North 5th Street
Minnetonka, MN 55401

Ms. Jeannine Clancy
Public Works Director
City of Golden Valley
7800 Golden Valley Road
Golden Valley, MN 55427

Ms. Peggy Leppik
Metropolitan Council
230 E. 5th Street
St. Paul, MN 55101

Mr. Brian Wagstrom
Public Works Director
City of Minnetonka
14600 Minnetonka Blvd.
Minnetonka, MN 55345

Terry Bovee
MDH - Mankato Field Office
Nicols Office Center Suite 500
410 Jackson Street
Mankato, MN 56001

Mr. Mike Lauseng
Water-Sewer Superintendent
City of Hopkins
1010 1st Street South
Hopkins, MN 55343

Mayor Mary Anne Young
City of Medicine Lake
10609 South Shore Drive
Medicine Lake, MN 55441

Mr. Robert Glanzer
Utilities Superintendent
City of Edina
4801 50th Street West
Edina, MN 55424

Mr. Guy Johnson
Public Works Director
City of New Hope
4401 Xylon Avenue North
New Hope, MN 55428

Mr. Adam Kramer
Water Superintendent
City of Minneapolis
350 5th Street West
Minneapolis, MN 55415

Mr. Thomas Mathisen
Public Works Director
City of Crystal
4141 Douglas Drive North
Crystal, MN 55422

Mr. Jim Calkins
Minnehaha Creek Watershed District
2500 Shadywood Road
Excelsior, MN 55331-9578

Mr. Richard E. Johnson
Chairman
Bassett Creek Water Management
8108 W. Franklin Avenue
St. Louis Park, MN 55164-0975

Ms. Gail Dorfman
Hennepin County Commissioner
A 2400 Government Center
Minneapolis, MN 55487-0240

Appendix F

Water Contingency and Conservation Plan



Minnesota Department of Natural Resources

500 Lafayette Road
St. Paul, Minnesota 55155-40__

August 16, 1999

City of St. Louis Park
Scott Anderson
3752 Wooddale Ave.
St. Louis Park, MN 55416

Dear Mr. Anderson:

WATER EMERGENCY AND CONSERVATION PLAN APPROVAL

The Department of Natural Resources (DNR) received the Water Contingency and Conservation Plan for the City of St. Louis Park that was prepared in compliance with Minnesota Statutes 103G.291. This plan is one of 317 water emergency and conservation plans that must be reviewed and approved by DNR. Due to the limited number of DNR staff available to complete this enormous task, the DNR has pursued several alternatives to improve response time for review and approval of plans.

In the Twin Cities Metropolitan Area (TCMA) there are 116 plans that are being reviewed by both DNR and the Metropolitan Council. To reduce duplication of effort, the DNR and Metropolitan Council have agreed to use the Metropolitan Council's comments as the technical input for plan approvals in the TCMA. This will allow DNR to devote more time on plans for communities in greater Minnesota and hopefully lead to better regional coordination of water emergency procedures and conservation practices in the TCMA.

The DNR has received the final Metropolitan Council comments regarding the City's plans. The Water Contingency and Conservation Plan for the City of St. Louis Park is hereby approved by the DNR. Please review the Metropolitan Council comments regarding the City's plan; you may contact Gary Oberts at 229-2079 if you have any questions about the items requested by the Metropolitan Council.

Improving water use efficiencies may be a lower cost alternative compared to constructing new wells or additions to water and wastewater treatment facilities. Please be aware that demand reduction measures must be implemented (M.S. 103G.291) before requesting approvals for new wells or increases in authorized water volumes. Approval of your water emergency and conservation plan will not satisfy this requirement unless demand reduction measures are actually being implemented. Demand reduction measures must include a public education program, an evaluation of your rate structure and its impact on conservation, and may include retrofitting or other programs. If you are planning to construct a new, please contact the DNR for approval of demand reduction measures.

Thank you for your cooperation and water supply planning efforts to promote the wise use of

DNR Information: 612-296-6157, 1-800-766-6000 • TTY: 612-296-5484, 1-800-657-3929

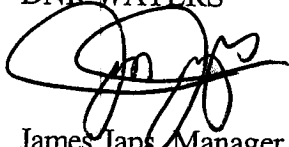
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water. Water emergency and conservation plans are required to be updated every ten years, but should be reviewed each year to address items included in the implementation schedule and to assess the effectiveness of conservation efforts. Please contact Thomas Mitchell at (651) 296-0512 or Jim Japs at (651) 297-2835 if you have questions about your plan or conservation programs.

Sincerely,
DNR WATERS

A handwritten signature in black ink, appearing to read 'Jim Japs', written over the printed name.

James Japs, Manager
Water Appropriation Permit Program

c: Ceil Strauss, Area Hydrologist
Metropolitan Council

5a

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EXECUTIVE SUMMARY

The City of St. Louis Park strives to provide the citizens of St. Louis Park with adequate amounts of clean, safe, drinking water in an environmentally and economically sound manner. Towards this goal, the City has developed this Water Contingency and Conservation Plan which provides the City of St. Louis Park and its residents with guidance for water system emergencies and conservation of the City's water supply.

The Plan is organized into five main sections including the introduction; the contingency planning; a description of the water supply system facilities; the conservation potential of the system including the long-term water conservation goals of the City and best management practices for meeting these goals; and the historical and projected water demand and adequacy of the system in meeting these demands.

The City has and will continue to be progressive in the implementation of plans and programs for water production, treatment, delivery, and conservation. The City plans on the following actions presented in this Plan and summarized below:

- The city has adopted an ordinance that will include the capacity and supply limits, emergency management controls, and will establish an enforcement policy.
- The City will conduct a study to determine the feasibility of installing additional emergency generators to meet emergency water supply needs.
- The City is currently using a uniform rate for water and sewer. A comprehensive rate study is projected in the near future. The study will include the options and effects of adjustable rates intended to promote conservation.
- The city will continue to promote information emphasizing effective sprinkling procedures.

Two goals have been established for increased water conservation in the next 10 years:

- Reduce total water usage, in terms of use per citizen, by 10%. Based on the 10-year total average of 144 gpcd, the new target is 130 gpcd.
- Reduce the maximum-day water usage, in terms of use per citizen, by 10%. Based on the 12-year average maximum gpcd of 263 gpcd, the new target is 237 gpcd.

The City will work to make best use of the Water Contingency and Conservation Plan. In order to meet the stated goals of the Plan, a program of activities focused on increasing the public's understanding and appreciation of water and water conservation has been developed. These activities will encourage residents of the City of St. Louis Park to utilize water conservation practices were applicable.

I. INTRODUCTION

1.0 BACKGROUND

The City of St. Louis Park strives to provide the citizens of St. Louis Park with adequate amounts of clean, safe, drinking water in an environmentally and economically sound manner. Towards this goal, the City has developed this Water Contingency and Conservation Plan which provides the City of St. Louis Park and its residents with guidance for water system emergencies and conservation of the City's water supply. It is intended to meet the Minnesota Department of Natural Resources (DNR) and Metropolitan Council requirements for water contingency and conservation planning. The DNR requires that a water contingency and conservation plan be adopted by each water utility which utilizes ground water as its source of water. In addition, the Metropolitan Council requires that an amendment to the comprehensive plan for each community for water contingency and conservation planning be approved by January 1, 1996. This requirement stems from the passing of Chapter 186 of the 1993 Legislative Session Laws. Guidelines have been produced by the Metropolitan Council in conjunction with the DNR for preparation of plans which will meet the requirements of both of these agencies. These guidelines are attached as Appendix A.

In addition to meeting the requirements of DNR and the Metropolitan Council, this plan has been developed to meet the following objectives:

1. Provide a framework for responding to emergency situations involving the water supply system.
2. Determine the potential for reducing the amount of water used by residents of the City of St. Louis Park, and establish a plan of best management practices for realizing water use reductions.

2.0 PLAN ORGANIZATION

The Plan has been organized into four main sections for ease of use by City Staff and residents. Section II contains the contingency planning portion of the document, which covers short-term and emergency situations. Section III provides a description of the water supply system facilities. Section IV outlines the conservation potential of the system, establishes the long-term water conservation goals of the City, and presents a program of best management practices for meeting these goals. Section V summarizes the historical and projected water demand for the City, and evaluates the adequacy of the system in meeting these demands.

II. CONTINGENCY PLANNING

1.0 INTRODUCTION

The goals of the water system contingency plan for the City of St. Louis Park are to provide a plan for responding to emergency events or situations, and to provide a continuous supply of potable water to the residents of the City of St. Louis Park. Potential emergency events include such natural emergencies as tornadoes, floods, ice storms and extended droughts. In addition, terrorist activity emergency events may occur which adversely affect the water system's ability to provide potable water to the system customers. Emergency events such as power outages; equipment failures; accidents; water contamination at the source, treatment plant or in the distribution system, may occur in addition to vandalism at well sites, treatment plants, or water storage areas.

The contingency plan is organized into four sections: Emergency Response and Evaluation Procedures, Preparedness Planning and Coordination, Community Response Plans and Supply System Information.

2.0 EMERGENCY RESPONSE AND EVALUATION PROCEDURES

Emergencies may affect the water system in a number of ways. The overall affect of the emergency is determined by the major system components affected. Major system components include water supply (wells and well houses), water treatment, water distribution, and water storage. In the event an emergency occurs, the following sequence of actions should be taken.

1. Contact Emergency Response Team (use 911 to contact police, fire, and medical authorities as needed).
2. Determine the effects of the emergency event on the ability of each of the major system components to provide service.
3. Estimate the duration during which system capacity will be impaired and the water demand (rate and total volume) during the emergency event.
4. Identify critical non-functioning components and corrective action required in order to place the components back on line.
5. Assign emergency response teams and tasks to accomplish corrective action. The emergency response teams should include personnel capable of performing the duties required and having the corresponding authority to make decisions on an as-needed basis.
6. Provide notification on an as-needed basis to the public and other communities regarding the actions the utility plans to take in response to the situation. Appendix B contains two media guides for communication in emergency situations and for conducting interviews and response to questions by the media.
7. An emergency evaluation and response worksheet has been included in Appendix C for use in the evaluation of the system.

In case of emergency, contact the Police Dispatch at (952)924-2618. The contact list in Table II-1 shows the community contacts for surrounding communities, the Minnesota DNR, Minnesota Department of Health, and the Metropolitan Council.

Table II-1 Emergency Response Community Contact List (9/29/04)

Person	Organization	Phone
Scott Anderson	City of St. Louis Park	952-924-2557
Jim Japs	MN Dept of Natural Resources	651-297-2835
Doug Mandy	MN Dept of Health	651-215-0757
Gary Oberts	Metropolitan Council	651-229-2079
Jim Malone	City of Minnetonka	952-938-1431
Greg Cook	City of Plymouth	763-509-5992
Bert Tracy	City of Golden Valley	763-593-8075
Adam Kramer	City of Minneapolis	612-788-3907
Roger Glanzer	City of Edina	952-927-8861
Mike Lauseng	City of Hopkins	952-939-1373

3.0 COMMUNITY PREPAREDNESS PLANNING AND COORDINATION

An emergency preparedness plan is essential to protect the public, the water supply, and the water supply system. The American Water Works Association (AWWA) has developed a manual titled Emergency Planning for Water Utility Management - Publication M19. This manual is available in the St. Louis Park, Superintendent of Utilities Office (Contact Scott E. Anderson, Superintendent of Utilities (952)924-2557). Chapter five of this manual provides an excellent outline for developing an effective emergency-preparedness plan.

Plan activation is a critical part of emergency response. The quicker the City is notified of a problem, the faster the plan can be initiated. The Superintendent of Utilities is responsible for obtaining warnings and alerts from the National Weather Service, the United States Geological Survey, etc. The emergency plan contains specific actions that are "triggered" by certain levels of warnings or alerts.

The ability of personnel to recognize emergency situations and to report them is critical to timely emergency response. Personnel are trained to recognize system changes that may warrant an emergency response. Appendix D, Figures II-1 (Service Request Form; Department of Public Works), II-2 (computer database form) and II-3 (Water Main Repair Form) provides example forms for the notification of water system emergencies by the general public. These forms are distributed to people that are likely to experience a water system emergency. The proper dissemination of information can help insure an

effective emergency response by the residents. The role of each resident in the community will vary, and dictates the type and amount of information they will be required to know in order to be prepared for a water emergency. The role of the general public in a water emergency is to protect themselves and to provide prompt notification to emergency response personnel. General information on water emergency response and water safety issues are periodically provided to residents in the residential information letter "Park Perspective" so they are educated on how to respond to water emergencies. Education materials should provide the public with tips on water emergency recognition, emergency response, and emergency contacts. Examples of educational materials are provided in Appendix E.

The City staff member that receives an emergency call from the general public should utilize an emergency notification report form as provided in Appendix D, Figure II-4 (Duty Personnel Log). When an emergency has been reported, calls should immediately be made to those contacts who administer the emergency-response plan. To expedite this process, a communication chart has been developed (Table II-1). This list provide details about the individuals responsible for directing the emergency response. A list of all water utility personnel, their phone numbers, and addresses, is maintained in the Superintendents office. A Support Call-Up List of subcontractors, department agencies and organizations, which often provide assistance to the water utility, is maintained in City EPP (Appendix F: Figure II-4).

If the emergency affects the quality or quantity of drinking water, priority customers (i.e. hospitals, etc.) are notified immediately. An example priority service notification form has been provided in Figure II-5 of Appendix F.

Without an emergency response plan administered by trained individuals, an emergency situation can quickly get out of control. Emergency-preparedness and training of utility personnel and the public is essential for an effective emergency-response plan. Training exercises in the form of drills allow personnel to practice emergency-response techniques and to evaluate procedures. Simulated water emergencies are recommended for municipalities to determine the relative effectiveness of their emergency response plan. Periodic training drills can bolster team confidence and provide a platform for emergency plan evaluation. Emergency response drills should include all of the individuals that will have a role in responding to such an emergency.

This emergency response and contingency plan should be periodically evaluated and updated to reflect changes and alterations in water facilities, infrastructure and personnel. Problems that arise as a result of training drills and exercises should also be addressed during plan evaluation. All aspects of the emergency response plan should be documented and filed. Appendix K includes a log sheet to be maintained with this plan to document amendments and revisions.

4.0 COMMUNITY RESPONSE PLANS

During some emergency events, responses may be required from the community. These responses include voluntary conservation of water, limiting of lawn watering, banning of lawn watering, or restrictions of water use on the City's larger water consumers. Priorities for water use during periods of limited supply are established in Minnesota Statute 103G.261. These priorities are as follows:

- First Priority:** Domestic water supply excluding industrial and commercial uses of municipal water supply and use for power production that meets contingency requirements.
- Second Priority:** All other water use involving consumption of less than 10,000 gallons per day.
- Third Priority:** Agricultural irrigation and processing of agricultural products.
- Fourth Priority:** Power production in excess of the use provided for the contingency plan under First Priority.
- Fifth Priority: Uses** other than agricultural irrigation, processing of agricultural products and power production.
- Sixth Priority:** Non-essential uses. These uses are defined as lawn watering, vehicle washing, golf course and park irrigation, and other non-essential uses.

For the City of St. Louis Park Water System, approximately 83% of all water use is identified as first or second priority water use. Sandoz Nutrition is the only user that consumes in excess of 10,000 gallons per day (gpd) accounting for about 5% of the City's water use. Water uses such as lawn watering, park irrigation and other non-essential uses classified as sixth priority make up approximately 12% of all water use.

During periods when water supply and/or distribution cannot meet the demands placed on the system, water allocation must be made based on the statutory priorities. Four community response steps have been defined, and are shown in Table II-2.

Table II-2 Community Response Steps

Response Step 1	Permanent sprinkling restrictions are in place. Customers not limit outdoor watering to every other day and no watering between noon and 6:00 p.m. Customers with odd-numbered street addresses alternate outdoor watering with even-numbered addresses. All municipal operations are placed on mandatory conservation with park irrigation limited as defined by the directors of parks and public works.
Response Step 2	A mandatory water conservation decree is issued, limiting outdoor watering by customers to once every five days. Watering of new lawns & trees will be allowed on an even-odd address basis. No watering between noon and 6:00 p.m. No private car washing will be allowed. Special water users, as designated by the City Manager, may be allowed a supplemental water allowance in order to maintain operations.
Response Step 3	A mandatory water conservation decree is issued, banning all lawn watering & outdoor water use. Major industrial/commercial user over 10,000 gpd may be restricted at the discretion of the City Manager
Response Step 4	A mandatory water conservation decree is issued, placing weekly limits on water use by all customers. Limits shall be set at the discretion of the City Manager, based on available supply system capacity, priority of users, and other pertinent considerations (i.e. nursing homes, hospitals, child care centers and schools).

Upon determination of the water system's capacity and the expected water demand, a determination of the community response level should be made. The implementation triggers and supply system conditions are shown in Table II-3.

Table II-3 Community Response Trigger Levels

Supply System Condition	Water Supply Capacity	Storage Capacity At 6:00 a.m.	Community Response Step
Water Storage Emergency Level 1	< 10.5 MGD (summer) < 8.0 MGD (winter)	5 MG	2
Water Storage Emergency Level 2	< 9.5 MGD (summer) < 7.0 MGD (winter)	4 MG	3
Water Storage Emergency Level 3	< 8.5 MGD (summer) < 6.0 MGD (winter)	3 MG	4

Trigger levels are based on historical data for summer (May through September) and winter (October through April) months. Trigger levels should be reviewed on a yearly basis, and adjusted as needed to reflect current demand conditions. The storage capacity trigger levels occur when levels cannot be maintained over a period of 1 to 3 days. Reference Capacity Data Log Appendix J.

The city will adopt an ordinance that will include the capacity and supply limits, emergency management controls, and will establish an enforcement policy.

5.0 SUPPLY SYSTEM INFORMATION

System information has been compiled for each of the four primary components. These are wells, water treatment plants, distribution system, and storage reservoirs. This information is contained in Section III of this document.

In addition, plan sets for the water treatment plant, pumping stations and standpipes are maintained at the utility superintendents office. A distribution system map is also maintained at the utility superintendents office for reference.

The City of St. Louis Park currently has interconnections with the cities Minnetonka and Plymouth. Additionally, they have the ability to reconnect previously abandoned connections with Golden Valley and Minneapolis.

The connection with Minnetonka is a 12 inch diameter main located on Ford Road. The connection with Plymouth is a 12 inch diameter main located on Betty Crocker Drive. These are alternative water sources in case of an emergency.

III. WATER SUPPLY SYSTEM DESCRIPTION

1.0 INTRODUCTION

This section provides a description of the existing water supply system for the City of St. Louis Park. Information in this chapter includes DNR permit information, water supplier information, and information on water supply, treatment and distribution facilities, as well as alternate water supply sources.

2.0 WATER SUPPLIER INFORMATION

The water supplier is the City of St. Louis Park. The Utility offices are located at 3752 Wooddale Ave., St. Louis Park, Minnesota 55416. The contact person for the water system is Scott Anderson, Superintendent of Utilities, 952-924-2557.

3.0 DNR PERMIT

The City of St. Louis Park appropriates water under DNR Water Appropriation Permit No. 731007. This permit allows the City of St. Louis Park to appropriate 2,500 million gallons of water per year. An amendment to the permit must be applied for if appropriations exceed the permitted amount.

4.0 WATER SUPPLY FACILITIES

The City of St. Louis Park derives its supply of water from a series of 10 wells. Table III-1 presents a brief summary of the well data, including aquifers from which each well draws water, year of construction, and the pumping capacity of each well. Appendix G contains further well data. Total supply capacity is 11,700 gallons per minute (GPM), which is equivalent to 16.8 million gallons per day (MGD). The firm well pumping capacity, which is defined as the well pumping capacity with the single largest well off-line, is 10,500 gpm, which is equivalent to 15.0 MGD. The firm well pumping capacity is commonly used as an indicator of a system capacity for providing service with one of the system wells not in service due to emergency or routine maintenance work.

Wells No. 7 and No. 9 are presently not operational due to damaged power source, operating, controls, and surge tanks. The wells are currently being evaluated as to the feasibility of putting them back in service or abandonment. Well No. 17 has not been used in the supply of water since 1987 and is in a standby mode. Its production is not included in capacity calculations.

The City is preparing a well head protection program. This program is being developed using the well head protection rules are published by the Minnesota Department of Health.

Table III-1 Well Data Summary

City Well #	Formation	Year of Construction	Well Rating In GPM	Well Production In GPM
3	Platteville-St. Peter	1939	1200	900
4	Praire du Chien - Jordan	1946	1270	1250
6	Praire du Chien - Jordan	1948	1300	1200
7	Praire du Chien - Jordan	1952	1250	Out of Service
8	Praire du Chien - Jordan	1955	1300	1200
9	Praire du Chien - Jordan	1956	1250	Out of Service
10	Praire du Chien - Jordan	1955	1350	1250
11	Mt Simon Hinckley	1960	1300	1200
12	Mt Simon Hinckley	1965	1300	1150
13	Mt Simon Hinckley	1964	1300	1200
14	Praire du Chien - Jordan	1965	1300	1200
15	Praire du Chien - Jordan	1969	1350	1250
16	Praire du Chien - Jordan	1973	1300	1150
17	Mt Simon Hinckley	1983	1000	Stand-by

5.0 TREATMENT FACILTIES

The City's water treatment facilities are designed to remove iron and manganese from the water supply. Treatment includes oxidation of iron by the use of chemical oxidants, air injection, filtration through pressure sand filters, and disinfection by the addition of chlorine. In addition, fluoride is added, as required by the State Department of Health.

The City of St. Louis Park has six warter treatment plants, which are located near the wells. Table III-2 shows the pump capacities at each treatment plant. Appendix J has a complete table of high service pumping rates for the six water treatment plants, in addition to the well production capacities for each of the city water wells.

Table III-2 Well and Treatment Plant Information

Water Treatment Plant	Well Number	Well Production Capacity in Gallons per Minute (GPM)	High Service Pump (HSP) Number	HSP Capacity In Gallons Per Minute (GPM)	Total Pumping Capacity
WTP #1	3	900	1	1800	1800
	11	1200	12	1800	1800
WTP #6	6	1200	5	1200	1200
			7	1500	1500
	9	Out of Service			
WTP #10	13	1200	9	1400	1400
			11	1400	1400
			16	800	800
Total GPM		11,700		15,900	17,550

Table III-2 shows the rated capacity going into the treatment plants, the capacity of the filters and the rated capacity of the high service pumps. The total well capacity going into the treatment plants is 11,700 gallons per minute (gpm) or 16.848 million gallons per day (MGD). These figures are based on the rated value of the pumps. Actual pumping production will be influenced by water availability of the aquifers and time of year. The total filter capacity of the treatment plants is 13,650 gpm or 19.7 MGD. The total output capacity of the treatment plants is 16,150 gpm or 23.3 MGD.

6.0 DISTRIBUTION AND STORAGE FACILITIES

The water distribution system in St. Louis Park consists of two pressure zones. One is the Shelard Park area, and the other one is the rest of the system. The Shelard Park maintains its pressure from the discharge pressure of Station No. 8 or Station No. 16. The rest of the system is pressurized through the elevated towers & high service pumps.

The water distribution system is fed by six water treatment plants located throughout the City. Table III-3 summarizes the distribution system storage.

Table III-3 System Water Storage Summary

Elevated Storage	Storage
Elevated Tower 2	1.0 mg
Elevated Tower 3	1.0 mg
Elevated Tower 4	1.0 mg
Total Elevated Storage	3.0 mg
Ground Storage	Storage
Ground Storage #1	1.5 mg
Ground Storage # 2	1.5 mg
Underground Storage # 3	1.5 mg
Underground Storage # 4	2.0 mg
Total Ground Storage	6.5
Total Water Storage	9.5

7.0 ALTERNATE WATER SOURCES

The City of St. Louis Park currently has interconnections with the Cities of Minnetonka and Plymouth. Additionally, they have the ability to reconnect previously

abandoned connections with Golden Valley and Minneapolis. These are alternative water sources in case of an emergency. The connection with Minnetonka is a 12 inch diameter main located on Ford Road. The connection with Plymouth is a 12 inch diameter main located on Betty Crocker Drive.

8.0 EMERGENCY POWER

At this time only Well No. 16 has emergency power in case of an electrical outage. This may not be a problem for the City due to distributed nature of various treatment plants that feed the distribution system. Historically, the city has never experienced a power outage which affected all treatment plants at one time. The City has conducted a study (completed 10/04) to determine the feasibility of installing an additional emergency generators at water treatment plants.

Table III-4 shows the motor horse power and the type of power for each of the well pumps. The information for the high service pumps is shown in Table III-5.

Table III-4 Well Pumps Power Source

Well No.	Motor Power (HP)	Power Type	Power Provider	Emergency Power
3	60	Electric	NSP	NONE
6	100	Electric	NSP	NONE
8	125	Electric	NSP	NONE
10	100	Electric	NSP	NONE
12	250	Electric	NSP	NONE
14	125	Electric	NSP	NONE
16	125	Electric	NSP	YES

Table III-5 High Service Pumps Power Source

High Service Pumps	Motor Power (HP)	Power Type	Power Provider	Emergency Power
1	100	Electric	NSP	NONE
5	75	Electric	NSP	NONE
7	75	Electric	NSP	NONE
9	100	Electric	NSP	NONE
11	100	Electric	NSP	NONE
13	50	Electric	NSP	YES
15	100	Not in Service		

9.0 AQUIFER MANAGEMENT

Due to aquifer contamination, the City has implemented an aquifer management and remedial action program. Under this operative plan, wells No. 4 and either No. 10 or No. 15 are run on a continuous basis. Water from these wells is filtered through an activated carbon treatment plant. This process controls the spread of aquifer contamination.

In addition, well No. 6 is utilized on a limited basis to help control the spread of aquifer contamination. Overall, this program has shown to be highly effective in managing the aquifer contamination, while allowing the City to meet the water demand of its residents.

As part of the aquifer management well levels in all municipal wells and Riley monitoring wells are taken on a semi-annual basis. A historical record of well levels is maintained in the office of the Superintendent.

IV. WATER CONSERVATION PLAN

1.0 INTRODUCTION

The objectives of this section of the plan are to determine the potential for water conservation, provide an evaluation of water conservation practices, and develop a program for implementation of long-term conservation practices. Short-term water conservation measures required due to drought or other conditions are outlined in Section III and V.

2.0 WATER CONSERVATION POTENTIAL

A. General

As outlined in Section V, the City has three primary categories to which water use is allocated. These categories are residential, commercial, and unaccounted-for water losses. Residential* water use accounts for the single largest portion of water used (62%), and represents an area with significant potential for water conservation. Unaccounted for water (6%) may represent another area with potential for water conservation, if a significant portion of the unaccounted for water is due to water leaks. Commercial water use accounts for 32% of the total water used. For both residential and commercial water use categories, it appears that a significant portion of water use is due to elective water uses, such as lawn and garden watering. As such, much of the focus of water conservation will be on reducing the amount of elective water use.

B. Potential Cost Savings Due to Water Conservation

Cost savings which the City of St. Louis Park may realize as a result of increased water conservation fall into two categories: lower operation and maintenance costs, and decreased capital expenditures.

Operation and maintenance costs for the water utility include the following items:

- Chemical costs (chlorine, fluoride, ammonia, etc.).
- Energy Costs for pumping.
- Maintenance and replacement of high-service pumps and equipment.
- Maintenance and replacement of well pumps and equipment.

* Residential also includes low volume commercial.

In addition, water conservation could result in lower operation and maintenance costs for the sanitary sewer system if conservation occurs in internal water consumption. Sanitary sewer operation and maintenance costs include the following:

- Energy costs for pumping.
- Maintenance and replacement of pumps and equipment.
- Metropolitan Council Environmental Services (MCES) charges.

C. Conservation Effort Focus Areas

Based on the water use analysis and the potential for achieving water conservation, water conservation efforts will be focused on three categories of water use, prioritized as follows:

1. Residential
2. Commercial
3. Unaccounted

The residential category was chosen as the primary focus of conservation efforts due to the large percentage of water used in this category. Conservation within this category has the highest potential for impact on the water system. Similarly, commercial water users were chosen as the second focus, as commercial water use is a significant portion of the overall water use. The City has been very successful in controlling water loss, therefore, the unaccounted category may or may not provide an opportunity for water conservation.

3.0 WATER CONSERVATION PRACTICES EVALUATION

A. General

A number of potential water conservation practices can be utilized to promote conservation and decrease the amount of water used. Potential water conservation practices include the following:

- Public Education
- Conservation oriented water rates
- Meter replacement and maintenance
- Reduction of water pressure
- Installation of efficient water fixtures Leak reduction
- Efficient outside water use
- Residential and commercial water audits

B. Water Rates

The water and sewer rates for St. Louis Park are included in Appendix H. The present rate is a uniform rate. A comprehensive rate study is projected in the near future. The study will include the options and effects of adjustable rates intended to promote conservation.

C. Meter Replacement and Maintenance

A regular meter replacement and maintenance program helps reduce the amount of unaccounted for water in the system, and provides accurate water use information to the user.

Currently, all water usage within the City is metered. An ongoing program of meter replacement has been established by the City. After 15 years of service, meters are removed and replaced with new meters..

D. Reduction of Water Pressure

Reduction of water pressure supplied to the customers may result in reduced water usage. Total consumption for household activities such as showering, car washing and lawn watering may be decreased by reduced pressure. Studies have shown that a 30 to 40 pounds per square inch (psi) reduction in water pressure results in a three to six percent decrease in water used.

The City operates on a system of two main pressure zones and several subsidiary zones. These pressure zones are established to maintain operating pressures in the range of 50 to 85 psi. Further reduction of pressure in the system may result in some areas experiencing low pressure. Thus, further water pressure reduction should not be considered for St. Louis Park.

E. Installation of Efficient Water Fixtures

Based on average, nationwide statistics, in a typical residence, water used inside of the home averages 77 gallons per capita per day (gpcd). Of this water use, the majority occurs in the bathroom, with showers, toilets, and toilet leakage accounting for 54% of the total in house use. The installation of water-efficient fixtures has been shown to result in an average drop of 17 gpcd in indoor water usage.

The Federal Energy Policy Act of 1992 requires that all new construction is to have water-efficient fixtures. It is estimated that a nearly 50% drop in the daily water usage for toilets, showerheads and faucets in a household will be realized by the year 2026 as pre-1996
City of

fixtures are replaced with post-1996 fixtures. For the City of St. Louis Park, this represents an average daily usage reduction of 0.82 MGD based on the ultimate population of 48,500. This may not have a significant affect on the peak

demands in the system, as peak demands tend to be seasonal in nature and usually correlate to outdoor water usage.

The Federal Energy Policy Act also requires that the Department of Energy must issue recommendations to states for establishing state and local incentive programs that encourage the acceleration of voluntary replacement of efficient water fixtures. The City should review the recommendations and consider an incentive plan.

F. Leak Reduction

Water loss occurs through leaks in the system, unmetered water use (ie. through fire hydrants or other unmetered use) and inaccurate meters. Leak reduction is focused on reducing the amount of unaccounted water lost through system leaks. Leak detection is typically done utilizing sonic leak detection equipment which amplifies leak sounds, or with a correlator, which uses a cathode ray tube display to show any leak sounds which occur between two points.

Water conservation potential is difficult to quantify due to the variability of the accuracy of the equipment, and the unknown quantity of water leaked throughout the system. A pilot leak detection program should be considered by the City in order to determine the potential for water conservation by leak reduction.

G. Efficient Outside Water Use

Outside water use typically accounts for 37% of residential water use. For St. Louis Park, only 12% of the total water used is for outdoor water uses. This usage is higher during summer months, when lawn watering and landscape irrigation are at a peak, and lower during winter months. Efficient outdoor water use thus has significant water conservation potential and is primarily focused on landscape and turf irrigation practices. The city will continue to promote information emphasizing effective sprinkling procedures such as "No sprinkling between noon and 6pm."

Because of the high outdoor usage experienced in summer months, and the impact this usage has on peak-day demand, efficient outdoor water usage has the potential to reduce the peak-day demand, and thus reduce capital expenditures planned to meet the peak-day. In St. Louis Park, based on average winter month per capita use of 117 gallons per day (gpd), and average summer month per capita use at 155 gpd, it is

estimated that up to 38 gpcd of water use in the summer months is attributed to summer outdoor water usage. This represents 25% of all water used during summer months. For the projected peak-day of 14.7 MGD, outdoor water usage will account for up to 9.0 MGD. According to information provided by the AWWA, a properly designed and operated irrigation system can reduce irrigation water use by 20 percent or more. Thus, if 20% increase in water use efficiency is targeted, the potential peak-day demand savings is 1.8 MGD.

Methods of increasing outdoor water use efficiency can be as simple as determining the proper time and application rates for lawn watering, and establishing guidelines for operational irrigation systems. Appendix E contains information sources for increasing water use efficiency.

H. Residential and Commercial Water Audits

Audits of specific households, provide feedback to customers in terms of how their water use compares to the average. Audits are conducted by utility staff, who meet with customers upon request or upon a "trigger" level. The water billing system notes high or low meter readings. A high reading triggers a water audit dealing with interior and exterior water usage. Internal audits would focus on leak detection and repairs, installation of toilet tank displacement devices, and low-flow showerheads. External audits would focus on turf irrigation practices, including timing and water application rates. Approximately 150 checks for excessive water use are performed each year; approximately 50 water audits are performed each year.

4.0 WATER CONSERVATION IMPLEMENTATION PLAN

A. Water Conservation Goals

Based on the potential of the consumer education on conservation practices, and the economic and environmental advantages of water conservation, two goals for increased water conservation in the next 10 years in the City of St. Louis Park have been established. These goals are outlined as follows:

Reduce total water usage, in terms of use per citizen, by 10%. Based on the 12-year total average of 144 gpcd, the new target is 130 gpcd.

Reduce the maximum-day water usage, in terms of use per citizen, by 10%. Based on the 12-year average maximum gpcd of 263 gpcd, the new target is 237 gpcd.

If these goals are met, the projected average and maximum-day demands will be reduced by ten percent. For the average daily demand, this results in a reduction from 7.0 MGD to 6.3 MGD. For the peak-day demand, this results in a reduction from 14.7 MGD to 13.2 MGD.

B. Implementation Activities

In order to meet the stated goals of the conservation plan, a program of activities focused on increasing water conservation has been developed. These activities will work to encourage residents of the City of St. Louis Park to utilize water conservation practices where applicable. A listing of the activities is as follows:

Develop a public education program.

Many customers have no knowledge of their water source, supply capacity or availability and necessary treatment and distribution costs. A public information program can help change this and help foster a conservation ethic among the water users. Voluntary commitment by customers is critical in achieving reductions in water use in water conservation programs. A successful public education program will help develop the commitment needed to achieve conservation. Staff will be assigned to develop a budget and schedule of activities for the public education program. The public education program may include the following:

- Public tours of the water treatment facility.
- Providing leaflets and booklets on water use and conservation at City Hall and through meetings.
- Articles, city-wide newsletters and newspapers.
- Visits to area schools by members of the City Staff.
- Provide information on efficient lawn watering and landscaping practices. A brochure on water use for landscaping has been included in Appendix E. This brochure is distributed by the University of Minnesota Extension Service, and is available to the public.
- Investigate resident interest in water audits.
- Staff will be available to promote conservation and provide information at neighborhood meetings.

Review Water Rates

The City of St. Louis Park annually reviews water rates to assure that rates are reflective of the cost of providing water service. The City will review invoicing procedures and rate structures and evaluate the impact changes in the frequency of invoicing may have on utility financing.

Leak Detection

The City of St. Louis Park will evaluate the need for a leak detection program.

Meter Replacement Program

The City of St. Louis Park will continue with the meter replacement program. The meter replacement program will have a goal of replacing meters in a 15 year interval.

V. WATER DEMAND ANALYSIS AND SYSTEM ADEQUACY EVALUATION

1.0 INTRODUCTION

This section provides a summary of the total water system demand, an analysis of water use in the City system, and an evaluation of system adequacy.

2.0 DEFINITIONS OF WATER USE CATEGORIES

Definitions of water use categories for the City of St. Louis Park are as follows:

Residential. Water used for normal household purposes, such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens (also called domestic water use which includes low volume commercial).

Commercial. Water used by motels, hotels, restaurants, office buildings, commercial facilities, and institutions, both civilian and military.

Industrial. Water used for thermoelectric power (electric utility generation) and other industrial uses such as steel, chemical and allied products, paper and allied products, mining, and petroleum refining.

Irrigation. Artificial application of water on lands to assist in the growing of crops and pastures or maintaining recreational lands such as parks and golf courses.

Unaccounted. Unaccounted for water is the volume of treated water pumped from the system minus the volume sold.

Institutional. Hospital, nursing homes, day care centers, and other facilities that use water for essential domestic requirements. These facilities are normally categorized as a commercial water use, but you may want to maintain separate institutional water use records for emergency planning and allocation purposes.

Wholesale Deliveries. Bulk water sales to other public water suppliers. Non-essential water uses include lawn watering, vehicle washing, golf course and park irrigation and other non-essential uses. Some of the categories listed above will also include non-essential uses of water because it is not possible for water suppliers to separate these uses for individual accounts.

3.0 SERVICE AREA POPULATION AND CONNECTION DATA

The City's water supply system provides service within the corporate limits of St. Louis Park. The Metropolitan Council projected the City's population will grow to 48,500 by the year 2010. The projected increase is due to redevelopment and multi-use buildings. Table V-1 shows the user categories. Residential connections include multi-housing and small commercial. Population served by the water utility is including in Table V-2.

Table V-1, Service Area Connections 2003

Category	Number of Connections
Residential	12,629
Commercial & Industrial	862
Institutional	89
TOTAL	13,402

4.0 WATER DEMAND ANALYSIS

Table V-2 presents the average daily demand and the maximum day demand for the past 10 years. The residential water use has accounted for approximately 67° of the water used throughout the system, with commercial water use composing 33°. Sandoz Nutrition is the only large volume customer, accounting for approximately 5% of the water use

Data for the past 10 years shows that the percentage of water used by each customer category has remained relatively stable. Thus, for future projections, historical water use percentages will not be adjusted.

Residential water use was further examined to determine the per capita daily use by the residents of St. Louis Park. Table V-2 shows that per capita water use has ranged from a high of 131 gallons per day to a low of 117 gallons per day, averaging 125 gpd.. When calculated the water per resident using the residential water sold, the average resident uses 80 to 90 gallons per day, averaging 83 gpd..

Unaccounted-for water averaged approximately 11.24% of the total water pumped (Table V-3). This is slightly over the acceptable range for water loss. The City has initiated a water leak detection program. All watermains are sounded each year for leaks. The City conducted a meter testing program in 2004 that tested large meters. The City has begun a meter replacement program to replace large meters that record less than acceptable percentage of flow.

During summer months, defined as May through September, the average per day usage increases 2.84 million gallons per day over the winter water daily usage. Although peak days increase from 6 mgd during the winter months to over 13 mgd in the summer months, the overall usage for lawn irrigation, car washing and other outdoor usage represents about 14% of the total water pumped per year.

5.0 WATER USE PROJECTIONS

Water use projection for the City of St. Louis Park have been made based on two primary assumptions.

1. Population will grow from approximately 44,896 to a projected ultimate population of 46,667 by the year 2010.
2. The mix of residential, commercial, industrial, and institutional will remain essentially the same. Thus, the percentage water use by customer category will remain as shown in Figure V-1.

Based on these two assumptions, and the per capita water usage shown in Table V-2, the ultimate projected water usage per day will increase from the previous 10 year average of 6.390 gallons per day to 6.645 gallons per day in 2010. The projected increase will result in a total production increase of about 4 %, totaling over 2.5 billion gallons per year.

6.0 WATER SUPPLY SYSTEM ADEQUACY

The maximum day water use is projected to be 14.3 MGD based on the projected population and a maximum day water usage. The average day water use is projected to be 6.985 MGD based on the projected population and an average day water usage of 143 gpcd.

The adequacy of the water supply system for the City of St. Louis Park can be assessed based on the capacity of well production. The treatment plant capacity and pumping capacity of the high service pumps exceeds the well production capabilities.

The combined well capacity shown in Table III-2 is 16.8 MGD. The well capacity of 16.8 MGD will meet the projected high day demand.

Storage is utilized to equalize demand on supply and production facilities by taking water into storage when production exceeds demand, and providing water from storage when demand exceeds production. System storage also equalizes demands on the transmission and distribution mains to minimize the required size of those elements and improves system flow and stabilizes pressure to better serve the customers throughout the service area. Storage also provides a reserve in the distribution system for emergencies, such as fire protection and power outages.

Storage needs are dependent on system demand and on the variations in demand that occur throughout the day. The minimum required storage is the amount that will equalize expected daily demand variations with production and provide the needed reserve for fire protection and emergencies.

CITY OF ST. LOUIS PARK

Utility Division

TABLE V - 2

Year	Population	Services	Billion Gallons Pumped	Million Gallons per Day	High Daily Million Gal.	Billion Gallons Sold to Customer	Average Daily Million Gal. Pumped	Per Capital Daily Gallons Pumped	Residential Year Billion Gal Sold	Per capita Residential Gallons Sold	Non-Residential Year Billion Gal Sold	% Residential Sold	% Commercial & Industrial Sold
2003	44,896	13310	2.441	6.688	13.315	2.005	6.688	149	1.357	83	0.647	68%	32%
2002	44,646	13305	2.220	6.083	11.554	1.891	6.083	136	1.290	79	0.601	68%	32%
2001	44,386	13305	2.374	6.504	15.061	2.043	6.504	147	1.404	87	0.639	69%	31%
2000	44,126	13318	2.499	6.846	11.713	2.094	6.846	155	1.338	83	0.756	64%	36%
1999	44,690	13321	2.480	6.793	10.844	2.089	6.793	152	1.377	84	0.712	66%	34%
1998	44,690	13316	2.367	6.485	11.481	2.097	6.485	145	1.352	83	0.745	64%	36%
1997	44,690	13,296	2.322	6.362	10.064	1.994	6.362	142	1.311	80	0.683	66%	34%
1996	44,690	13,249	2.520	6.904	11.314	2.142	6.904	154	1.471	90	0.671	69%	31%
1995	44,690	13,245	2.061	5.647	11.098	1.977	5.647	126	1.316	81	0.661	67%	33%
1994	44,565	13,240	2.040	5.589	11.234	1.922	5.589	125	1.295	80	0.627	67%	33%
10 Year Average	13,291	2.332	6.390	11.768	2.025	6.390	143	1.351	83	0.674	67%	33%	

The most common method for evaluating system storage requirements utilizes the design criteria that during maximum usage periods, 90% of the demand occurs during the peak 16 hours of usage. Thus, storage must be provided of sufficient volume to make up the difference between demand and supply capacities. In addition, the AWWA recommends that one-third of the usable volume be dedicated as emergency and/or fire reserve volume. Based on these criteria, and the current maximum day demand of 13.3 MGD, the required system storage is 4.4 million gallons. Thus, St. Louis Park's 9.0 MG of storage is adequate

7.0 CAPITAL IMPROVEMENT PLANS

Capital improvement plans for the water supply system are included in Appendix I. The capital improvement plans for the City of St. Louis Park include the rehabilitation of all six water treatment plants, including installation of equipment for reduction of radium levels in the water. The program will not affect the volume of water produced but will enhance the overall water quality. The other capital improvements deal primarily with maintenance items, such as tower painting, meter and water main replacement. Thus, little impact is expected on the capital improvement plans due to increased water conservation.

8.0 IMPACT ON LOCAL COMPREHENSIVE PLAN

The water system for the City is generally fully developed. As commercial and residential redevelopment occurs in the City, evaluation on a site-by-site basis will be required to determine the systems ability to meet the needs of the development. Generally, redevelopment will have lower water system needs than the system design capacity. Thus, no impact on the local comprehensive plan is anticipated.

REFERENCES

- (1) American Water Works Association. Back to Basic Guide to Emergency Planning. An AWWA Small Systems Resource Book. AWWA, Denver (1991).
- (2) American Water Works Association. Manual of Water Supply Practices: Emergency Planning for Water Utility Management (Third Addition). AWWA, Denver (1994).



Emergency Operations Standard Operating Procedure (SOP)

Issue: Hazardous Spills

Department: Public Works Utilities

Date Created: June 15, 1999

Date Revised: September 21, 2004

By: Scott Anderson, Utilities Superintendent

Related to Other System Plans?

Yes—Related to: Wastewater Collection and Temporary Traffic Control

Dept Head Approval: Michael P. Rand **Date:** 9-21-04

1. **Objective:** To provide services to contain the spill.
2. **Criteria for invoking SOP:** A spill of classified Hazardous Materials.
3. **Expected life of the SOP:** Until the clean up of spill is completed.
4. **Roles, responsibilities, and authority:**
City employee receiving notification of spill will call Police dispatch and Fire Department for first response. The Fire Department will assume command of sight, notifying the Minnesota State Duty Officer and Hazardous Materials Unit, if required. The Utilities Superintendent or designee (person on call) will mobilize Public Works staff. Staff (employee callout order to be determined in descending order using the Utilities / Operations (#2-10) followed by Utilities / Plant (#1-4) to assist in the containment of spill and identification of effect on storm sewer system.

5. Procedures and resources for operating SOP:

The Utilities Superintendent or Supervisor will assess the scope of the emergency and notify the Director of Public Works and the Superintendent of Operations.

- The Utility Operations staff will be available to assist the Fire Department and/or HazMat Team.
- During containment and clean up. The use of City equipment will also be available upon request.

6. Criteria for returning to normal operating mode:

Until the site is contained and cleaned of all harmful Hazardous Materials. If the MPCA is notified, they will provide direction on status.

7. Procedures for returning to normal operating mode:

HazMat Unit will inform the Supervisor of any special procedures required.

8. Procedures for determining the cost of SOP:

All labor, rental hours, and material costs will be logged on a form during operating the SOP. Upon completion of emergency efforts, the Supervisor will submit all costs.

9. Post event plan:

A post emergency meeting of all affected parties will be conducted to critique the emergency effort and the current SOP plan. A written review with recommended revisions to the SOP plan will be provided to the Director of Public Works.

10. Testing of SOP:

Testing of this SOP will be included in the Emergency Operations Plan exercise.